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THE SURGERY OF ACCESS FOR THE USE OF RADIUM IN THE PELVIS.¹

By L. S. Kidd, M.D., B.S., F.C.S.A.,
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By the title of this paper I mean the use of surgical operation to gain access to deep areas into which it is desired to place a quantity of radium for therapeutic purposes. It is thereby hoped to reach glands beyond the area originally irradiated by the surface application at the seat of the primary growth. The γ rays have a certain lethal action up to one centimetre, but it is generally conceded that they have a damaging action to carcinoma cells up to five centimetres. This is really a clinical observation and I fear is not heartily supported by laboratory workers. I propose to limit myself to the consideration of carcinoma of the uterus and rectum.

¹ Read at a meeting of the Victorian Branch of the British Medical Association at Bendigo on May 24, 1930.

The Uterus.

In reviewing the treatment of cervical cancer, the Heyman technique has the best results. It is reported that among the operable cases 40·4% of patients were alive after five years; of those with border-line growths 16% were well after five years and those with inoperable growths 13% had no recurrence during that period. It is important to note that 40% of all so-called operable growths were proved at operation by Victor Bonney to have glandular involvement, that is 60% of operable growths have not glandular involvement, and of these Heyman cures 40% by surface, vaginal and uterine application alone. Thus of 100 operable growths by this technique 40 have glands and are not cured, 40 have no glands and are cured and 20 which have no glands, are lost through some unrecognizable factor.

Carcinoma of the cervix is one of the sensitive growths to radium; its secondary deposits are just as amenable to treatment; they do not lose their radio-sensitivity through being placed in different surroundings, as many other secondaries do. It is

a very rare thing for a recurrence to appear in the cervix or vagina, hence it is never necessary to remove the uterus. Recurrences occur at the periphery due to under-dosage from a distance.

Lethal rays from intrauterine and vaginal application do not reach the extreme limits of the malignant invasion, even in many operable cases. The percentage of cures leaves a fair margin to be exploited and the results improved upon. The border-line or operable growths with glands are reached by the Wertheim operation with a cure rate of 40% and for the Heyman technique a 16% cure rate is claimed. To equalize the results in this class radium must be placed within reasonable range of the glands. This can only be attained by surgical access to the area. I propose to mention two methods.

The first is that practised at Saint Bartholomew's Hospital. In this the abdomen is opened about eight weeks after the cervix has been treated and the reaction has practically subsided. Sixteen needles, each 3·2 centimetres long, containing two milligrammes of radium, are inserted into the posterior surface of the broad ligament, extending from one sacro-iliac synchondrosis to the other and spaced about one centimetre apart; six needles are inserted into the anterior surface of the broad ligament in order to reach the obturator glands and the infection in the vicinity. The only objectionable feature is that the abdomen must be reopened in seven days to remove the needles, but the second operation is short and is well borne.

The second method is that practised in the gynaecological clinic of the Westminster Hospital and originated by Mr. Dodd. He opens the abdomen, ligates the ovarian vessels, divides the round ligaments and opens the broad ligaments to remove the glands—a sort of miniature Wertheim operation *minus* the hysterectomy. Four catheters are then inserted, two on each side, and inside each catheter are placed five to ten needles each containing one milligramme of the element with a one millimetre platinum screen. The catheters are fixed inside the broad ligaments and one is led out through a stab wound near the anterior superior spine and the other through a stab wound near the internal ring. The broad ligament is resutured and in seven to ten days the catheters are withdrawn through the stab holes, thus obviating reopening the abdomen. These two methods represent a reasonable endeavour to follow up the line of attack on the cervix. No figures are yet available for the five-year period, but the indications are encouraging. The third step is a course of deep X ray therapy.

The Rectum.

The rectum is the other domain I should like to discuss. This is a less explored region and the results not as uniform as in the uterine cases. The rectal mucosa is very sensitive to γ rays and the lethal dose for an adeno-carcinoma closely approaches the limit of tolerance for normal columnar cells, so that much care is needed to

prevent conditions almost as painful and distressing as the original malignant condition. The intrarectal application of radium is used chiefly for inoperable cases and seldom for the operable ones. Unfortunately the good results got by surface application to the cervix are not to be obtained in the rectum. The field for intrarectal surface application is very limited and unsatisfactory. The tendency is to treat early cases by operation, the border-line cases being considered the most suitable for radium. Epitheliomata frequently react well whilst the adeno-carcinoma is said by Regaud to be very resistant. Sir Charles Gordon Watson does not entirely agree with that.

In practically all cases a preliminary colostomy is done, but where there is no obstruction it has been dispensed with occasionally. One might have expected to do without it in anal growths, but the rays so damage the sphincter that nothing is gained by not doing a colostomy. Rectal growths may be divided for our purpose into: (i) Intraanal, (ii) ampullary, (iii) pelvi-rectal; and in order to treat these sites three avenues of attack are open and the surgery of access consists of (i) needling through the perineum, (ii) the abdominal route, (iii) the post-rectal route.

Needling Through the Perineum.

The skin of the perineum, about three centimetres from the anal margin, or in women the wall of the vagina, is perforated by needles two centimetres long and containing two milligrammes of the element; they are regularly spaced around the growth and guided into position by a finger in the rectum. The treatment lasts nine to ten days, the dosage being 4,500 milligramme hours, which is about the limit of rectal tolerance.

The Abdominal Route.

The transperitoneal route for a pelvi-rectal growth is through a mid-line incision immediately after the preliminary colostomy which if possible is not opened until the needles have been removed. A clear field and good view of the site necessitates a very high Trendelenburg position. One needle is placed along the inferior mesenteric artery at the base of the recto-sigmoidal mesentery, two along the superior haemorrhoidal artery, one ring of needles one centimetre long around the growth and if possible a few through the peritoneum directly with the growth, one along each *levator ani*. The silk threads of the needles are tied into two bundles, placed in a rubber tube and brought out through the wound. Gauze wicks soaked in antiseptic act as drains, whilst a dam of dental rubber is placed transversely across the area for protection and to keep the intestines out of the way. Provided the peritoneal reaction is not too severe, nothing is disturbed for seven days.

The Post-Rectal Route.

The post-rectal route as devised by Newmann and Coryn is by an incision from the tip of the sacrum to the margin of the anal sphincter where the wound

splits into two limbs making an inverted Y. The coccyx is removed, the ampullary growth examined and mobilized, needles being sewn around it in a regular way, one needle along the margin of each *levator ani* and one into each ischio-rectal fossa. The wound is packed with flavine gauze and completely closed except for the entry of a catheter which carries antiseptic into the wound to keep the gauze moist. The stitches are removed and the gauze withdrawn after the seventh day.

Complications.

The great bugbear of rectal use of radium is sepsis. The wounds heal very slowly and are often covered with a radium scum that takes a long time to separate, a sinus often persisting for three or four months. An overdose may cause sloughing and necrosis around the needle holes with perforation of the bowel; the fistula, however, is not generally a serious complication when the colostomy is functioning.

A few patients do so well as to encourage the hope of cure. Proctitis is often most severe, causing much distress; even in uterine cases much care is taken to prevent its appearance.

Post-radium strictures are fairly frequent, especially after constricting growths; it is often impossible to make a satisfactory rectal examination, the prognosis being based on the well-being of the patient.

In some cases when the response has been excellent, the growth has healed, giving a perfect result with local scarring without stricture and easily visible through a sigmoidoscope. Even in uterine growths three strictures of the rectum appeared in a series of 300. Some results I saw were ideal, whilst others were most disappointing, but when success is secured the patient has a healed colostomy and a functioning rectum, and the serious abdomino-perineal excision with its mortality of 25% is obviated.

I think in pelvic malignant disease radium combined with the surgery of access ought to be considered and the pros and cons duly weighed before it is decided to subject the patient to an operation of the first magnitude.

RHEUMATOID ARTHRITIS: A DISCUSSION OF ÆTILOGY AND SOME PRINCIPLES OF TREATMENT.¹

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I HAVE employed the somewhat unfashionable name rather than the more up-to-date *arthritis deformans* in order to indicate an apparent distinction between two classes of arthritis embraced by the latter term. In classifying types of arthritis, after excluding such conditions as traumatic

arthritis, arthritis of known bacterial origin, for example, gonococcal arthritis, arthropathies and constitutional dyscrasias as in gout and haemophilia, we recognize a distinction between proliferative and degenerative types of tissue change.⁽¹⁾ The former constitutes the group which I am designating as rheumatoid arthritis. The majority of cases of osteoarthritis belong to the latter group. Osler links the two together as different manifestations of a single disease and points out that the various changes associated with the two conditions may occur in the same person and even in the same joint.⁽²⁾ Graham⁽³⁾ expresses the same belief when he states that a diagnosis of osteoarthritis is dependent on the stage in which the condition is first seen. Other writers distinguish sharply between the two conditions. It may be that they are both due to the same influences, acting in the case of osteoarthritis less acutely or differing in their effects owing to senescence or other changes in the tissues, this affection commonly appearing later in life.

Consideration of the aetiology of rheumatoid arthritis may well follow a study of the morbid anatomy. The early changes in the tissues are essentially vascular in nature, constriction of arterioles and capillary dilatation and stagnation being followed by permeation of capillary walls by fluid and in-wandering of small round cells from the reticulo-endothelial system. These changes occur in the peri-articular tissues, the synovial membrane and the bone-marrow.⁽⁴⁾⁽¹⁾ By way of contrast, we note that in the osteoarthritic group the initial changes are degenerative in the cartilage with later marginal proliferation of cartilage cells and bony change, while the early round cell invasion of the tissues is practically absent. In the later stages the two conditions may more nearly approach one another and the end results are often characterized by considerable deformity and limitation of movement.

Of associated changes muscular atrophy is often striking and there may be neuritic and trophic disturbances. Many observers⁽⁵⁾⁽⁶⁾ have reported the association with this condition of gastric hypochridermia and atony of stomach and intestines. The earlier history of these cases often reveals a series of deviations from the normal.⁽⁷⁾ These are the patients who have always suffered from the cold, with blue hands and chilblains every winter. Llewellyn has drawn attention to the frequency of mucous colitis, urticaria, blanching of the fingers and erratic sweats which characterize childhood and adolescence. In short, the earlier history of many of these patients is one of autonomic instability.

Having stated this much in regard to predisposing and associated factors, let us agree for the moment that as regards aetiology some focal infection is probably an invariable accompaniment of the arthritis. The frequent discovery of obvious focal sepsis and the rapid amelioration of symptoms in many cases following the clearing up of this sepsis

¹ Read at a meeting of the Victorian Branch of the British Medical Association at Bendigo on May 24, 1930.

are too well known to warrant emphasis. One, of course, must admit at once that in many cases a focus of infection is not apparent, also that very often the elimination of a focus does not in any way benefit the condition. We must recognize, however, that even such an accessible condition as dental apical infection may very easily be overlooked, while foci (perhaps secondary) in intestine, gall bladder or appendix may be quite beyond detection. It is interesting to note that Vines in his book on "The Parathyroid Glands in Relation to Disease" states that occasionally when using parathyreoid therapy in chronic infective states certain septic foci have appeared to be activated which had shown no evidence of existence before the therapy was used. As to removal of a focus failing at times to improve the condition, we must remember that foci are often multiple. Thus in a series of 80 cases recorded by Brock,⁽⁸⁾ 42 patients had had some focal infection removed, but all of them still had other foci remaining; 25 had lost tonsils and 22 of these still had infected teeth. An original focus in the mouth may lead to a secondary focus in the gall bladder, which latter may cause the rheumatoid condition to persist and even become steadily worse after all oral infection has been cleared up.

To understand the relationship between the focal infection and the arthritis, let us study the mechanism by which the offending organism appears to produce the joint changes. Most investigators agree that the joints are not the site of bacterial invasion. We have already noted the frequent relationship between this condition and various allergic states; and the idea is gaining general acceptance that rheumatoid arthritis itself is a manifestation of the condition known as allergy, which means altered reactivity or sensibility. This contention is supported by the sometimes astonishing results of therapy by non-specific protein injection. As Osgood⁽⁹⁾ points out, whenever the body harbours a definite focal infection, this focus, if it continues for two weeks or longer or is frequently repeated, may make the body allergic or hypersusceptible to bacterial substances which are given off by the growing bacteria that are absorbed. Another factor, however, is necessary, something which renders the capillaries more permeable and allows the escape of these substances into the joints and tissue spaces.

Leaving that point for a moment, let us review certain known facts relating to the allergic state. It is almost an axiom that this condition is founded on a disturbance of balance in the autonomic nervous system. Here, in passing, we recall Samuel's⁽¹⁰⁾ classical experiments on rabbits' ears showing the important influence of autonomic nervous control over the process of inflammatory response to irritation and suggesting that efficiency on the parasympathetic side is necessary to a satisfactory inflammatory reaction.

Now certain common factors underlying disturbance of autonomic balance have been illustrated in a recent communication by Corlette on calcium

deficiency.⁽¹¹⁾ In a comprehensive study this writer adduces evidence that autonomic imbalance particularly in the direction of deficiency of the parasympathetic or extended vagus system can be produced by deficiency of calcium and phosphorus, by lead poisoning and by deficiency of vitamins *B* and *D*; and he further indicates that in fact minor degrees of such imbalance are very common amongst us. The calcium content of the blood is intimately associated with a healthy condition of the endocrine system, particularly with adequacy of parathyreoid function. Weston Price's experiments on rabbits,⁽¹²⁾ in which he found that the experimental production of a septic focus led to reduction of the active and later the total calcium in the blood, may probably be interpreted in terms of toxic disturbances of the endocrine system due to the infection. The relationship of vitamins to blood calcium is such that in conditions such as rickets and tetany where the calcium and phosphate content of the blood are diminished, the administration of vitamin *D* or its synthesis in the body by the action of ultra-violet radiation effects a speedy return to normal conditions.

Deficiency of blood calcium and/or vitamins *B* and *D* is also associated with increased permeability of capillaries and perhaps of cell membranes also. In the alimentary tract the changes produced in animal experiments⁽¹³⁾ by such deficiency are degeneration of mucous membrane and muscle coats, deficiency of secretion, including gastric hydrochloric acid, atony and distension of bowel and penetration of bowel walls by bacteria.⁽¹⁴⁾

There are other pathological states caused by vitamin deficiency that are of great interest in relation to our present study. Deficiency of vitamin *A* leads to a greatly increased tendency to spontaneous infections, beginning in the mucous membranes of the intestinal and respiratory tracts and in the eye; while resistance to infection experimentally produced is lessened by deficiency of vitamin *B*. A lack of any of the vitamins may lead to degenerative or fibrotic changes throughout the bone marrow.⁽¹⁵⁾ It has also been suggestive to read Spriggs and Marxer's description⁽¹⁶⁾ of a pre-diverticular state which corresponds to the condition of the large bowel produced by vitamin deficiency, and to note how these observers, approaching the question from an entirely different angle, remark the frequent association between diverticulitis, arthritis and focal infection.

From the foregoing observations we may now advance the hypothesis that in the aetiology of rheumatoid arthritis there are two considerable primary factors, the infecting organism and a susceptibility or inadequate antagonism to it. In a minority of cases the former factor is of supreme importance and in these removal of the focus cures the disease. In the majority of cases there is a sensibility to infection comprising just such a set of conditions as is produced by deficiency of vitamins, essentially vitamins *B* and *D*, which not only renders the body susceptible to infection, but

actually predisposes the tissues to changes which characterize this disease when infection occurs. The mechanism by which this factor produces its effects, includes infection, autonomic imbalance, endocrine disturbances and metabolic disorders characterized by deficiency of oxidative processes associated with large areas of vaso-constriction and capillary stagnation. In certain cases one or other of these secondary disturbances may seem to preponderate over all others, as when the endocrine upset associated with the menopause turns the scale against a patient till then apparently healthy. However, the menopause is ordained to be a normal physiological experience; and in these cases the logical conclusion is not that the change of life is the cause of the morbidity, but that this process itself is disturbed by one of the primary factors above mentioned.

I have time now only sketchily to refer to principles of treatment arising out of this conception of aetiology, though I hope to deal with them more fully in a later communication on focal infections. If we bear in mind the various factors which may be at work, we can often decide in a particular case which is preponderating in its influence and direct attention primarily to that. Frank sepsis should always be eliminated; it depresses so many helpful bodily activities and very often maintains a vicious circle to the detriment of the patient. In the present state of our knowledge, autonomic and endocrine disturbances are probably most effectively or with least uncertainty benefited by administration of vitamins *B* and *D* or by synthesis of vitamins by irradiation with ultra-violet rays. Vitamin *A* may help to overcome any focal infections which have not been dealt with directly. Though calcium deficiency may be a common dietary error, it has been stated that a diet would seldom be so deficient in calcium that an adequate supply of vitamins would fail to maintain a normal content of calcium in the blood. However, we usually advise the ingestion of vegetables and fruit which provide calcium, and reduce cereals which antagonize vitamin function. Furthermore, in certain cases, especially associated with menstrual disturbances and the menopause, exacerbation of symptoms seems to be directly related to excessive menstrual loss with its concomitant calcium depletion; and in these patients administration of calcium-sodium-lactate with or without parathyreoid gland is advisable during and after each menstrual period. In addition, as there is often some disturbance of carbohydrate tolerance,⁽¹⁷⁾ the reduction of carbohydrate intake for a time is desirable; the blood sugar curve, however, often returns to normal after removal of sepsis. Improvement after exhibition of colloidal sulphur has been associated with checking of the sulphur demineralization⁽¹⁸⁾ resulting from deficiency of oxidative processes. It is possible that sulphur, iodine, manganese and thyreoid gland owe their beneficial effects to stimulation of metabolic processes, an effect which is obtained by ultra-violet ray therapy.

In cases where it appears to be necessary, desensitization to the pathogenic organism may be undertaken by vaccine therapy, either by minute desensitizing doses of specific (autogenous) vaccine⁽¹⁹⁾ or by large shock-producing injections of some non-specific protein⁽²⁰⁾ which increases the whole body metabolism and mobilizes tissue enzymes.⁽²⁰⁾ There are also various drugs, for example, guaiacol carbonate, which have been administered in the hope of inducing excretion of some toxic substance.

There is one principle of treatment which in practically all cases I consider is of the greatest importance, that is rest and its complementary factor, regulated exercise. Rest is a fundamental principle of treatment in all inflammatory conditions. In the acute stages of arthritis it should be absolute for the joints involved, though during this time the muscles may be kept toned up by massage or gentle faradic stimulation. When the condition is less acute, rest is still necessary, but as our aim is ultimate restoration of full function in the joint, we introduce a daily or twice-daily passive movement through the whole pain-free range, aiming to go a little further each day, but calling a halt if ever the condition next day is more acute or the pain-free range diminished. Horace Pern⁽²¹⁾ has reported cases in which this treatment has given excellent results. It is probable that a factor in these cases is a carefully controlled autoinoculation, such as plays so important a part in the successful treatment of pulmonary tuberculosis; but how far this autoinoculation consists of the absorption of "macroscopic or microscopic exudations and chemotactic combinations"⁽²²⁾ or to what extent it results from the general increase of metabolism and activity of toxic antigens and inflammatory response in the joints would be difficult to decide. I consider, however, that such a method is a fundamental part of the successful treatment of this formerly rather hopeless malady. Very careful control is necessary. The movement of joints must be neither excessive nor too early undertaken, nor yet inadequate nor too long delayed. Such a course necessitates in most cases a period of inactivity lasting some months and calls for the closest cooperation between patient and doctor and much confidence on the part of both; but experience of cases so treated encourages the belief that, taken in the early stages, rheumatoid arthritis is eminently curable and even when the condition is more advanced, the results of treatment in terms of arrest of activity, relief from symptoms and restoration of function can be exceedingly gratifying.

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A RECENT EPIDEMIC OF SCARLET FEVER.¹

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DURING November and December, 1929, an epidemic of scarlet fever occurred at a girls' school in Woodend. The school has about 110 girls, all of whom are boarders, and is situated a few miles out of the town, so that it comprises, practically speaking, an almost isolated community. Ten cases occurred in all and though there were no really extraordinary features, these ten cases showed several interesting points which induced me to make a record of them. Also, because of the isolation already referred to, the study of the origin and course of the epidemic became additionally interesting.

I propose first of all to enumerate the main features of the cases which occurred, and afterwards deal with the general features of the epidemic as a whole. The cases have been tabulated in the order in which they occurred, showing the presence or

absence of the typical symptoms which are stated to be usually present in a normal case of scarlet fever. These are: (i) Inflamed throat, (ii) "strawberry" tongue, (iii) rash and, lastly, (iv) desquamation.

TABLE I.

Number of Case.	Age.	Date.	Throat.	Strawberry Tongue.	Rash.	Desquamation.
I	11	Nov. 5	Atypical	Absent	Absent	Present
II	12	Nov. 5	Atypical	Absent	Absent	Present
III	11	Nov. 7	Typical	Present	Present	Present
IV	12	Nov. 9	Typical	Present	Present	Present
V	13	Nov. 15	Typical	Doubtful	Absent	Present
VI	13	Nov. 23	Typical	Present	Present	Present
VII	12	Nov. 23	Typical	Present	Present	Present
VIII	14	Nov. 24	Typical	Present	Present	Present
IX	13	Not known	No record	No record	No record	Present
X	14	Nov. 28	Typical	Present	Present	Present

It will be noticed from the table (omitting Case IX, for reasons which will be apparent later) that in two cases throat appearances were atypical, in three cases the "strawberry" tongue was absent or doubtful and in three the typical rash was absent. It will also be noticed that the cases, generally speaking, became more typical towards the end of the outbreak; actually they also became more severe. Desquamation was the only constant symptom.

Case III, the first typical infection, had the following history:

On November 2 the patient arrived at school for the first time and almost at once complained of feeling tired and "off colour." She also vomited once or twice during the first twenty-four hours after her arrival. Although she improved somewhat and went into school, she was not really well and on November 7 she again vomited, her temperature rose rapidly to 37.9° C. (100.2° F.) and her pulse rate to 120. On examination that evening the fauces and soft palate were found to be inflamed, though not very painful; the tongue was evenly coated, with a few small red papillae showing through at the tip and the body was covered with a mild scarlatiniform rash. The face, arms and legs were free from the rash and no circumoral pallor was noticeable. The whole clinical picture was very suggestive of a mild attack of scarlet fever, although the patient did not appear to be or feel very ill. However, a diagnosis of possible, even probable, scarlet fever was made and the patient treated accordingly.

The same evening I saw Patients I and II also.

These two were sisters, who had both complained of sore throat for two days. Their temperatures were respectively 37.2° and 37.3° C. (99° and 99.2° F.); the onset of the symptoms had been gradual and not sudden and, apart from a slight coating of the posterior portion of the tongue and some engorgement of the tonsils and uvula, neither of them presented any abnormal signs whatever. There was no suggestion of the "strawberry" tongue and never at any time did either of them show any rash.

In these two cases I was, I confess, misled and I did not at first consider the infections to be scarlet fever. The patients were, however, isolated and subsequent events proved that they were undoubtedly suffering from a mild form of the disease. Another point which caused difficulty in the diagnosis of these two cases, was the fact that they both gave a history of a previous attack of scarlet fever. I am unable to find any definite figures relating to second attacks, but it seems to be generally accepted that, although uncommon, second attacks do occur. If

¹ Read at a meeting of the Victorian Branch of the British Medical Association at Bendigo on May 24, 1930.

the previous history in these two cases was correct, they were both examples of second attacks, as well as of the type known as "*scarlatina sine eruptione*."

Case IV, occurring two days later, was a typical example of mild scarlet fever and the occurrence of this one left no doubts concerning the diagnosis of the three previous cases.

Case V was interesting. I saw the patient only a few hours after the onset; the body, upper arms and thighs were covered with a very faint erythema, so slight as to be scarcely noticeable, but there were no raised spots. It seemed certain that within another twelve to eighteen hours she would develop a typical scarlet rash. Instead, the erythema rapidly faded, yet ten days later she presented a perfect picture of a case of scarlet fever during the period of desquamation.

Cases VI, VII, VIII and X were all typical examples of the disease, each one being rather more severe than the previous one.

Case IX was discovered accidentally on November 26 and will be referred to later.

When the epidemic was at its height, the Council of the School arranged with Dr. F. V. Scholes, of the Infectious Diseases Hospital at Fairfield, to come up and investigate the outbreak with a view to discovering any possible cause and any means of checking the advancement of the disease.

Together, Dr. Scholes and I spent the best part of a day at the school and discovered some interesting features of the epidemic. The whole school had been away for the week-end from October 24 to October 28. The first recognized case, number 3, had occurred on November 7, five days after the patient's arrival at school and eleven days after school had resumed. It might at first appear that she had introduced the disease into the school. But the general consensus of opinion seems to be that the incubation period of scarlet fever is usually two to four days, although periods up to twelve days have been recorded; hence it is more probable, I think, that this girl (Case III) arrived at school in poor health and with a lowered resistance and was infected two or three days after her arrival. Patients I and II had both been back at school since October 28, that is, nine days prior to the appearance of their symptoms on November 5, which means that they also must have been infected after their return to school, unless we are prepared to accept an incubation period of at least ten days in both instances.

It appeared likely, then, that either there was a "carrier" present in the school or, what was just as probable, an unrecognized case of mild scarlet fever. With a view to discovering either or both of these, we examined the throats of some ninety or more girls on November 26. Thirty-one appeared to be suspicious and were swabbed, the swabs being cultured for haemolytic streptococci. During this routine examination, as a matter of interest we examined the hands of most of the girls and discovered the one tabulated as Case IX. Her throat

showed signs of recent infection and her hands showed the typical pinhole desquamation of scarlet fever. Her temperature was 37.2° C. (99° F.) and she gave a history of having had "a bit of a sore throat about three weeks ago." She had never reported and had obviously suffered from a very mild form of scarlet fever. Her statement "about three weeks ago," if extended slightly would go back to the beginning of November, about three or four days after her return to school. But whether she arrived at school in an infective condition or whether she in turn had been infected by some carrier whom we were unable to discover, will never be known for certain. If the table is referred to again, it will be noticed that the intervals between the cases are as follows (omitting Case IX): Two days, two days, six days, eight days, one day, four days. As each patient was absolutely isolated from the time of appearance of the first symptoms, the intervals of six and eight days must, I consider, preclude the possibility of infection from each successive patient to the next, unless we allow an incubation period of seven to nine days which is not probable. It is therefore quite possible that patient IX who was not isolated until November 26, was responsible for the infection of some at least of the earlier patients. The possibility of infection from fomites must, of course, also be considered and among a large number of girls in close contact with one another, may have been a relatively important point. Of the thirty-one girls whose throats were swabbed, twelve gave positive results, that is, haemolytic streptococci were present in their throats. These 12 were in turn isolated from the rest of the school and all others, unless doing examinations, were asked to leave for home as soon as possible. The 12 "positives" were given daily gargles of perchloride of mercury one in 4,000 and were reswabbed a week or ten days later. They were not allowed to leave school until the swab yielded no haemolytic streptococci.

Case X which occurred on November 28, occurred in a girl who was passed during the routine examination on November 26 as having a healthy throat. Evidently she was then in the incubation period, but showed no sign whatever of infection. No other cases occurred, but this one showed that we may have missed others who, having apparently healthy throats, were possible carriers of haemolytic streptococci. The Dick test, to discover those who were susceptible to scarlet fever, was not used. Had it been used earlier in the year, it might have been useful, but the main object was to get the girls away from school as soon as possible. To close the school immediately was not advisable. To distribute among the public between 90 and 100 girls, all contacts to some degree and some of them possibly potential sufferers from scarlet fever, would have been little short of criminal. Fortunately the conditions prevailing, as stated at the beginning, made the school almost an isolated community and the girls were sent away only after it was reasonably certain that they would not carry any infection.

Treatment in the Cases which Occurred.

The school proved to be adequately suited to the isolation of the actual infections which occurred. The patients were all nursed together on a large glassed-in balcony or "sleep-out" which comfortably accommodated ten beds. The whole wing attached thereto was reserved entirely for them and included bathroom and lavatory accommodation, a large sitting-room for convalescents, a pantry and sleeping quarters for the nurse. As none of the infections was serious, one nurse was able to manage all the patients, especially as some were practically convalescent before the last infections occurred. Meals were sent up from the main kitchen and left outside the ward. Apart from this none of the patients had any contact with any other member of the building.

Treatment was given along general lines, including ample fluids and light diet during the febrile period especially, with a mixture containing sodium salicylate and perchloride of mercury during the first few days when the throat was painful. Every patient was kept in bed for a minimum of three weeks from the day of onset and a routine gargle of perchloride of mercury, one in 4,000, given once a day. The urine was tested at intervals of two days. Most of the patients had traces of albumin in the urine from time to time, but none persisted for longer than three weeks.

Two patients developed a mild catarrhal otitis at a late stage, about the fourth week, but both cleared up in a few days with instillations of glycerin and carbolic acid.

Two others showed rather persistent slight discharge from the nose and throat which was cleared up by placing two drops of a 10% solution of argyrol in each nostril twice a day.

Only one serious complication occurred.

Patient III during the fifth week suddenly developed a right apical pneumonia which rapidly spread and involved the upper and middle lobes on the right side and a few days later the middle lobe on the left side also. Associated with this was an *otitis media* on the right side which fortunately subsided fairly quickly. Later, fluid was detected in the left pleural cavity; aspiration on two occasions relieved the condition and no further complications followed.

Apart from this one case, no complications of any severity occurred. The majority of the patients were discharged six to seven weeks after the commencement of the illness, all signs of desquamation having ceased and, what I take to be more important, all signs of discharge from the nose, throat and ears having also ceased. No treatment by scarlet fever antitoxin was given, as none of the infections seemed severe enough to warrant it. From figures relating to the susceptibility of children of various ages to scarlet fever, it seems that between the ages of ten and twenty the susceptibility is about 20%.⁽¹⁾ So that out of 110 girls there was a possibility of at least twenty infections. Considering the close contact, the number of cases was, therefore, not very great and the fortunate

thing was the mildness or absence (with one exception) of complications.

Following the discharge of the last patients the whole school was thoroughly fumigated by a firm of professional fumigators and thrown open to the sun and air for several weeks before the opening of school in 1930. These means seem to have been successful, for no further cases have occurred this year.

Acknowledgement.

I wish to thank Dr. F. V. Scholes for the great help he afforded me at all times during this epidemic.

Reference.

⁽¹⁾ "Nelson Loose-leaf Medicine," Volume I, page 467 J.

THE CARE OF THE PREMATURE BABY.¹

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Association.*

In dealing with premature babies, we have to do with infants who are the results of varying lengths of pregnancy, of varying degrees of physical vigour and varying weights. Generally speaking those infants born of healthy mothers are more vigorous and have a better prognosis than those who are born of a mother whose health is impaired, whether the impairment be due to a toxæmia of pregnancy, such as albuminuria or eclampsia, or to the toxæmia of such diseases as syphilis, nephritis, tuberculosis or cardiac disease. In all prematures we have to contend with a child endeavouring to support itself with immature organs, but in the case of a baby born of a mother debilitated by some toxæmia, the premature baby has the extra burden of a systemic poison to prejudice its chances of survival.

The birth weight of viable premature babies ranges from one and a half pounds to five pounds and over. Although prematures of less than seven months (twenty-eight weeks) gestation do occasionally survive, it is so rare that for practical purposes we may take it that a foetus of under seven months is not viable. The further advanced the pregnancy, the better are the baby's chances, though we still hear the popular belief that although the seven months baby may survive, the eight months child always dies.

The foetal age is a much better guide to prognosis than is the weight. A small older child has a better chance of survival than a younger one weighing more.

A recent investigation undertaken in Victoria showed that 50% of premature babies die. There are, of course, many premature babies, especially those children of toxic mothers, whose chances are negligible from the start, but there are undoubtedly

¹The first of a series of post-graduate lectures on Infant Welfare arranged by the Council of the Victorian Branch of the British Medical Association, delivered on May 15, 1930.

many premature babies who, with more intensive care and nursing, might have been saved.

The care of the premature is almost entirely a matter of detail and I think in no other instance is skilful and faithful nursing so well repaid.

The care of the premature baby really begins before the baby is born. Unfortunately when a baby is born prematurely, everyone is taken by surprise, attention is concentrated on the mother and the baby is often overlooked until he is chilled and blue.

Before the birth of the child someone should be relegated to preparing for the baby. A warm blanket should be ready to receive the baby and a warmed incubator should also be in readiness. When the child is born, he should be wrapped in the warm blanket and if possible the cord should not be cut till it has ceased pulsation as the extra blood the baby derives will be of great benefit to it.

The baby should then not be bathed or oiled, but, wrapped in its warmed blanket, it is placed in its incubator and left for six hours or longer, if necessary, to overcome the stress of the birth. He should then be oiled with warm oil, being disturbed as little as possible in the process. He should not be lifted out, but oiled in the incubator, being uncovered, oiled and covered up again in sections in just the same way as a very sick patient is sponged in bed. He is then dressed. For the first week or so the dress consists of a jacket of cotton wool or gamgee tissue. This may be kept in place by a flannel jacket or cape reaching from the neck to the toes. A lined woollen bonnet covers the head. The arms and legs are wrapped in cotton wool extending over the tips of the fingers and toes respectively, the cotton wool being kept in position by gauze bandages. Instead of a napkin, a pad of absorbent wool is used.

As the child becomes older and more active, generally in the second week or later, a knitted woollen singlet may be necessary to keep the wool or gamgee in place on the trunk. The wool layer can then be made thinner. As the child becomes more active also, it is found that a napkin instead of the pad becomes necessary.

I do not think that it is necessary to adhere closely to any one mode of dressing the baby. The essentials are that the clothing should be warm and that it can be taken off and put on with a minimum of disturbance to the child.

After being dressed the child is wrapped in a blanket or flannel shawl.

An incubator which is very simply made and is satisfactory, is one which consists of two dress basket lids, one several sizes smaller than the other. The large basket is lined with a blanket and three hot water bags or bottles are placed between it and the smaller basket, one at the foot and one at either side. The smaller lid is also lined with a blanket and a small, firm pillow is placed in it. The pillow is covered with a layer of flannel and the child is then placed on the pillow, the two lining blankets being drawn up in envelope fashion, leaving an

adequate space for ventilation at the baby's head. To indicate the temperature of the incubator a bath thermometer is incorporated in the incubator just outside the baby, where the thermometer is easily accessible. The temperature which the bath thermometer registers when the infant's rectal temperature is 37.2° C. (99° F.) should be noted. This varies with different children; the more delicate the baby, the higher the temperature of the incubator must be, but usually it is found that the temperature of the incubator is somewhere about 35.1° C. (95° F.), though it may vary from 25.3° to 37.8° C. (80° to 100° F.).

It is found necessary to keep the hottest bag at the foot, temperature about 85° C. (185° F.), and the other two bottles at the side, temperature 73.9° C. (165° F.); as the child becomes stronger less adventitious heat is required.

The hot water bottles are filled in rotation at intervals sufficiently frequent to keep the incubator at the temperature necessary to maintain the child's rectal temperature at 37.2° C. (99° F.). The usual interval is four hours, though it may vary from one to five hours.

Most authorities advise that the child's temperature be taken twice a day. As a matter of practical experience I find that if this is done, very marked variations in the child's temperature occur, the temperature rising sometimes to 39.4° C. (103° F.) or falling as low as 35.6° C. (96° F.). It is, I think, necessary to take the child's temperature every four hours and at the Mothercraft Home we are in the habit of charting the temperature of the baby and the cot every four hours.

Various authorities recommend that the room in which the premature baby is kept, should be kept at certain definite temperatures. Provided the child's temperature is kept steady by means of a carefully controlled incubator, I do not think that the temperature of the room matters. When I have had the temperature of the room charted it has usually been 21.1° to 23.7° C. (70° to 75° F.) and occasionally 25.3° C. (80° F.). The room should be well ventilated, but the child's incubator, placed on a table or two chairs, should be suitably protected from draughts.

Where institutions employ electrically heated and controlled incubators one must be careful to have the humidity of the room kept at 55%. With our home-made incubators we do not have the same trouble with the drying of the air and the humidity can be left to look after itself.

The child is not bathed, but is oiled every second or third day, depending on the strength of the baby. The oiling should be done in the incubator as previously described, the baby not being lifted out.

One of the biggest difficulties in looking after the premature infant is the maintenance of the body temperature. This hypothermia is brought about by a variety of factors. The central nervous system of the premature infant is not fully developed and the heat regulating mechanism shares in this

immaturity. The premature infant also has very little subcutaneous fat, this being laid down principally in the last two months of foetal life and this lack of fat increases his loss of heat. He has, moreover, a large surface for his small bulk and therefore loses heat rapidly. He is sluggish and torpid muscularly and so generates little heat. Thus deficient heat production, excessive heat loss and faulty nervous control of the heat regulating mechanism all play a part.

The means by which we can prevent chilling of the baby are those we have outlined: (i) Prompt attention at birth so that the temperature is not allowed to fall. Once the temperature has fallen, say, to 35.6° C. (96° F.), it may take forty-eight hours of careful work to get it up to normal. In many cases it never rises again and the baby becomes cyanosed and dies. (ii) Clothing the baby sufficiently warmly. (iii) Maintaining the incubator at the correct temperature for the individual baby. (iv) Oiling to cleanse the baby and so preventing the exposure, handling and chilling attendant on bathing. It is not uncommon to see the baby packed up too warmly and this, while not so dangerous as chilling, is of great disadvantage to the baby.

I am quite sure that the regular and steady maintenance of the premature baby's temperature is one of the most important points in securing its survival, ranking equally with the necessity for adequate nutrition of the child.

The Feeding of the Baby.

Some authorities advise that boiled water only should be given for the first twenty-four hours. More recently it has become the custom to begin feeding twelve hours after birth, the bowels having usually acted by this time. This procedure has resulted in a smaller initial loss of weight and it certainly seems more rational than to starve these delicate infants for the whole twenty-four hours.

The manner in which these infants are fed will depend on the powers of the child. The child who can both suck and swallow is the most fortunate of the premature children. If he is breast fed, his incubator should be taken to the mother's bedside. She leans over and places the nipple in his mouth so that he can suck with the least possible effort. In only exceptional instances is the child strong enough to stand being lifted from his bed and nursed in the ordinary way. The premature infant should be allowed to suck for only a few minutes at first, the remainder of the breast milk being expressed and fed to him by eye dropper *et cetera*. As he becomes stronger, he can suck for a longer period.

If the baby is artificially fed and is a good sucker, he may be given a bottle, but here again care should be exercised to see that he does not exhaust himself by sucking too long in the early days of life.

The great majority of premature babies fall into the group of those who are able to swallow, but unable to suck. The food must then be introduced into the baby's mouth. The usual method of

administering food in these circumstances is by an eye dropper or small pipette with a piece of soft rubber tubing attached to the end so as to avoid injuring the mouth. In premature babies the process of swallowing is very slow and the laryngeal and pharyngeal reflexes are poorly developed or absent. For this reason it is important not to feed the child at all rapidly, as otherwise the lack of pharyngeal reflex will allow food to be aspirated and the lack of laryngeal reflex prevents it from being expelled by coughing. Thus either suffocation or an aspiration pneumonia is set up with very often fatal results. Feeding the premature infant is therefore a tedious and protracted business. The child should be carefully watched and no further food introduced until what is in the mouth has been swallowed.

If the child is so feeble that it can neither suck nor swallow, it becomes necessary to feed him by gavage. When this is necessary, it is done every three or four hours and is not as a rule carried on for more than one to two days. A soft rubber catheter, sterilized, number 5 English or 12 or 13 French size, is required. The distance is measured from the tip of the child's nose to the ensiform cartilage. This varies from 10 to 15 centimetres (four to six inches) and the length is marked off on the tube. The tube with funnel attached (previously sterilized) is passed down the child's oesophagus up to the mark on the tube and one centimetre further. The funnel is lowered to allow escape of gas, the tube is then withdrawn to the mark and the feeding is run into the funnel with the tube compressed. This allows escape of the air in the funnel. The feeding is then slowly run into the stomach. The tube, if passed this distance, reaches the lower end of the oesophagus just above the cardia which, being patent, allows the food to enter the stomach.

As regards the interval of feeding, although many advocate the three-hourly interval, I have always found it difficult to get sufficient into the babies unless I employ the two-hourly interval, omitting one night feed and, as the child becomes stronger, two night feeds.

The amount of food necessary will depend on the type of food employed so that it will be of advantage to consider them together. The amount of food necessary for the twenty-four hours is generally taken as that which will furnish the child with sixty calories per pound of body weight. If the premature baby can be made to take this, it is found that it gains weight satisfactorily. The premature infant may maintain life on considerably fewer calories than this, but he will not gain. This is, of course, not an arbitrary rule, as the individual premature baby varies in its needs and digestive capabilities. In the early days of life it will not be possible to get the premature baby to take this amount, and later some hungry babies, particularly if under-nourished, will require more. The sixty calories per pound is, however, the amount I aim at, subject to individual variation. The most usual

feedings for premature babies are: Breast milk yielding twenty calories to the ounce; cow's milk variously modified, the whey-milk mixture, that is, the split protein popularized by Sir Truby King, so often and favourably used, giving 13·5 calories to the ounce; whole lactone syrup milk yielding twenty-two calories to the ounce; undiluted Nestle's milk gives sixteen and a half calories to the fluid drachm and varying dilutions of this are used, a strength of one in twenty-two giving five and three-quarter calories to the ounce.

The amounts of the different foods necessary to supply the baby with sufficient calories, that is, with sufficient nutrient, will therefore depend on the nutritive value of the food, the value being shown by the caloric value per ounce. For instance, one ounce of breast milk will be equivalent to three and a half ounces of Nestle's milk, one in twenty-two, or to one and a half ounces of the whey-modified milk. It is therefore impossible to prescribe the same quantity of food where feedings of different composition and nutritive value are employed. Breast milk is the food for these babies. It is the most easily digested and assimilable food which we can give to a baby and at the same time it is one of the most concentrated foods we employ. Both of these qualities are of inestimable advantage to the baby with his immature digestive organs and his inability to take big feeds.

The possibility of being breast fed is one of the biggest factors governing the prognosis of the premature baby. If the baby's own mother is unable to yield breast milk, every effort should be made to obtain it from another mother. Though this is sometimes possible in midwifery hospitals, it is impracticable as a rule after the first ten days. In America they have wet nurses' bureaux and in Sydney I know of one foster mother who yielded eighty-three ounces, that is, over half a gallon of breast milk per day. She was able to feed her own child and several premature babies; but in Melbourne we have no facilities for wet nurses, so that if the mother has no breast milk we have to fall back on artificial feeding. Every effort should therefore be made to have the mother's breasts secreting. If the premature baby is too weak to suck, we are unfortunately deprived of one of the most powerful stimulants to the secretion of milk. In these circumstances the breast milk should be expressed regularly every four hours and it is often an advantage if a vigorous baby from some other mother can be put to the other breast while the milk is being expressed. The strong sucking of the normal baby will stimulate the milk flow.

In some very delicate premature babies who are unable to digest breast milk, as shown by vomiting and by green, curdy, undigested stools, it may be necessary to modify the breast milk by boiling or dilution, but this is only very seldom necessary. When a premature baby is being fed with expressed breast milk, we know how much it is getting, but when the baby is sucking the mother's breast, the only method of knowing how much the child is

getting is by test feeding. As the premature baby who is able to get all his food from the breast is generally vigorous, he will stand the test weighing, whereas the frequent weighings of a more weakly child prove exhausting. The amount of breast milk the premature baby requires per day for its growth and maintenance, can be calculated as three ounces per pound of body weight or the amount in ounces can also be calculated by multiplying the child's weight in pounds by sixty and dividing by twenty. Similarly, the number of ounces of the whey-milk mixture necessary for the day is found by dividing the total caloric requirements by 13·5; for lactone syrup milk divide by twenty-two and so on. This gives us the number of ounces per day of the particular food required and the amount at each feed will vary with the number of feedings per day.

Suppose we take as an example a baby of two weeks, weighing four pounds. His theoretical caloric needs are 4×60 , that is, 240 calories. If he be breast fed, he will require $240 \div 20$, that is, 12 ounces per day. If he is being fed every two hours for ten feeds he will require one ounce one and a half drachms per feed. If he is on the milk-whey mixture he will require $240 \div 13·5$, that is, 18 ounces per day or one ounce six and a half drachms per feed. That is, the amount at each feed varies with the nutritive value of the food employed and with the number of feeds per day.

I find that the most generally satisfactory artificial feeding for premature babies is the milk and whey mixture which is, roughly speaking, a mixture of equal parts of milk, whey and water with lactose added up to 6·9%, that is, two level packed tablespoons to the pint, and lime water in the proportion of one ounce of lime water to a pint of feeding. Appended are the various ingredients for making various amounts of the food.

To make whey use one-third more milk than the amount of whey required, half a rennet tablet to a pint of milk (skimmed). Dissolve the tablet in a little water and add to milk which has been heated to 37·8° C. (100° F.). Stand till set. Break up the curd with a fork and bring to the temperature 52·2° C. (155° F.). Strain and again bring whey to 52·2° C. This gives us a feeding composed of carbohydrate 6·9, protein 1·4, fat 1·4. The carbohydrate is present as lactose, the protein is present as the coagulable casein and soluble lactalbumin of the milk, while we have also in the whey extra lactalbumin. The amino-acids cystin and lysin present in lactalbumin, have been proved to be valuable for growth in young animals and this protein is also easily digested. The fat is kept low because of the difficulty the infant has in digesting a foreign fat. The addition of lime water is helpful in aiding in the digestion of the curd. In delicate premature babies it is not infrequently necessary to make the mixture still more readily digestible. In the routine feeding the milk is boiled for five to ten minutes, but often it is necessary to simmer the

milk for twenty minutes. The use of barley water as a diluent instead of water is also frequently beneficial.

The skin of the premature baby is very easily irritated and it is not uncommon for excoriation of the buttocks to occur. Under these circumstances the replacement of the lactose with the less easily fermentable cane sugar in corresponding amounts is useful, nine teaspoons of cane sugar being equivalent to eleven teaspoons of lactose.

Nestle's milk is, I think, less satisfactory as a feeding for premature babies, though in circumstances where the more complicated milk and whey mixture cannot be made, it is an easily made food.

Lactone syrup milk as a feeding for premature babies is used in some places as a routine. It is attractive because it is a concentrated food of high caloric value, twenty-two calories to the ounce, and, moreover, is very easily prepared. I have so far not been successful with this in the feeding of premature infants in whom it has caused troublesome vomiting. I should be glad to know the experience of others in feeding this, undiluted, to premature babies.

I would be interested also to know what conclusions others have come to as regards feeding maternal milk to premature babies of severely albuminuric or eclamptic mothers. The toxæmia to have resulted in a premature baby must have been severe. I have often noted that these babies persistently vomit their mother's breast milk, whereas milk from another mother or an artificial feeding the babies will retain. After seeing some babies persist in vomiting and coming to a fatal end, I have weaned one or two babies and they, after a stormy time, have survived. I am not sure that this weaning was the correct thing to do, but it seemed to me that the maternal milk was definitely toxic.

In the first seven to ten days of life the premature baby cannot take his full caloric requirements. We must temper the feeding to his digestive capabilities, particularly with the artificially fed child. It is always advisable to dilute the feeding with an equal part of water for the first four days. For the next six days or so increase to two parts of the feeding and one part of water, being guided by the reactions of the baby till we get him on to the usual premature feeding, somewhere about the tenth day.

With Nestle's milk we start with one to twenty-four or one to twenty-two and gradually increase.

The initial loss of weight of the premature baby varies, being relatively greater than that of a full-time baby. The average loss is 11% and the average age at which the birth weight is regained, is twenty to thirty days. It seems that there is room for improvement here and that we should find means to enable the birth weight to be regained more rapidly.

The average gain for babies under five pounds is three and a half to four ounces per week and for babies over five pounds, five ounces per week.

A lusty premature baby may be weighed twice a week, but for a delicate premature baby once a week is quite sufficient and in very feeble children it is wise to dispense with it till the child becomes stronger. Even though the weighing can be done in a minute and the child be wrapped in a warm blanket during the procedure, it is not uncommon to find the child knocked out with a falling temperature.

When the infants are carefully nursed and fed I have not found vomiting troublesome. The vertically situated stomach and poorly developed cardiac sphincter make vomiting easy, but slight elevation of the head and shoulders will prevent this postural vomiting. Constipation is rare, the bowels usually acting about three times per day. Where constipation does occur, the passage into the rectum of an oiled catheter is usually satisfactory. If not, small doses of paraffin, a quarter to a half drachm, or milk of magnesia, five to ten drops or more, may be given. The buttocks easily become excoriated and attention to the diet with perhaps a small amount of precipitated chalk, if the stools are acid, is helpful. The buttocks, if excoriated, should be oiled, not washed and some sedative ointment applied, for example, zinc and castor oil or zinc cream.

The fluid intake aimed at is one-sixth of the infant's body weight in fluid, that is, about two and a half ounces per pound of body weight. If a breast-fed baby is getting his full amount of milk, the feeding will contain the fluid necessary. Similarly, our artificial feeds which are more diluted even than breast milk, contain sufficient fluid. If a baby were being fed on whole lactone syrup milk, he would require extra water.

General Measures.

The avoidance of infection is highly necessary because of low resistance of these children. These infants should, wherever possible, not be nursed with sick children. They should have no attendants who are possible sources of infection, and no visitors. The feeding utensils should be sterile and the nurse's hands clean.

The avoidance of handling is a very big factor in the care of these infants. The indiscriminate lifting in and out of cots, exposure in oiling and handling in feeding are greatly to be deprecated. Every effort should be made to exhaust them as little as possible. They should have their position changed gently every three to four hours.

Some delicate babies will need a stimulant, for example, brandy, one to two minims, in water or aromatic spirits of ammonia, one to two minims, every four hours. Cyanotic attacks are a frequent and dangerous complication. They are predisposed to particularly by the poorly developed condition of the respiratory centre. In addition, the soft, weak ribs and respiratory muscles and the tendency to atelectasis favour the condition. Aspiration of food or vomitus and distension of the stomach may be responsible. Big variations from the normal

temperature may result in these attacks and they are very frequent in the under-nourished and in babies under two and a half pounds.

Treatment consists in lowering the head of the cot, the institution of artificial respiration, giving of oxygen and the administration of stimulants by mouth or hypodermically of which, I think, camphor is the best. If the child does not respond, a mustard bath of one teaspoonful of mustard to a gallon of water will often be life saving. If the attacks are frequent, immersion in a bath with a temperature of 38.9° to 40.5° C. (102° to 105° F.) with friction, particularly along the spine is said to give good results. I have been struck by the fact that (ignoring the frequent cyanotic attacks in those miserable premature babies who live one to two days) where the premature babies are carefully looked after by a full and experienced staff, these attacks of cyanosis are surprisingly few. This would lead us to hope that by skilful nursing cyanotic attacks may be very greatly diminished in incidence and severity.

Pneumonia in premature babies is predisposed to by their low resistance to infection and their tendency to atelectasis. Their resistance may be so low that they may not have a raised temperature, there being restlessness, rapid respirations and cyanosis, while the cough may be very slight. In addition to stimulant by mouth, hypodermic injection of 0.13 milligramme (one five-hundredth of a grain) of strychnine or 0.06 to 0.03 milligramme (one-thousandth to two-thousandths of a grain) of atropine may be employed.

In artificially fed premature babies orange juice is begun when the infant is about one month old, starting with a few drops in water in between the feeding and increasing. Some authorities say that most premature babies develop rickets, but I do not think this holds good in Australia. As, however, a premature baby enters the world with a deficient store of mineral salts, most people start him off with a few drops of cod liver oil when he is about a month old. To prevent the tendency to anaemia which is seen so very commonly in these children, iron in some form is often administered in the second month, for example, 0.03 gramme (half a grain) of iron carbonate or of iron and ammonium citrate once a day.

Later the question will arise as to when the premature baby can be treated as an ordinary baby. This should be when he can maintain his body temperature. His hot bottles are removed one by one (though in cold weather one at the foot should be retained), he is dressed as an ordinary baby and finally his incubator is dismantled and he is placed in an ordinary cot. If he maintains his temperature after all these proceedings, he has graduated from the premature stage and is now in the normal baby class.

Appendix.

The whey-milk mixture in varying amounts is shown in the following table. It is composed of carbohydrate 6.9, protein 1.4 and fat 1.4. Its caloric value is 13.5 calories per ounce.

To make—	Fresh Milk.			Whey.			Lime Water.			Boiled Water to—			Sugar of Milk.		
Oz.	Oz.	Tab.	Oz.	Tab.	Tea.	Oz.	Tab.	Tea.	Oz.	Tab.	Tab.	Oz.	Tab.	Tea.	
5	1½	3	1½	3	1½	0½	—	—	2	5	10	—	—	2	
10	3	6	3½	6	2½	0½	1	—	10	20	1	—	—	—	
15	4½	9	5	10	—	0½	1	2	15	30	1	2½	—	—	
20	6	12	6½	13	1½	1	2	—	20	40	2	0½	—	—	
25	7½	15	8½	16	2½	1½	2	2	25	50	2	2½	—	—	
30	9	18	10	20	—	1½	3	—	30	60	3	0½	—	—	
35	10½	21	11½	23	1½	1½	3	2	35	70	3	2½	—	—	
40	12	24	13½	26	2½	2	4	—	40	80	4	0½	—	—	

Accurate measures should be used. The lactose is measured in tightly packed, levelled-off spoonfuls.

COLLAPSE THERAPY IN PULMONARY DISEASE: INDICATIONS FOR AND AGAINST INDUCING ARTIFICIAL PNEUMOTHORAX.¹

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COLLAPSE therapy in treatment of pulmonary disease has been in use now for so many years and so many practitioners are conversant with its scope and technique, that I fear I shall recapitulate to a great extent what is common knowledge. Nevertheless I hope that I may evoke the expression of opinion of those of you whose experience may differ from my own, and so help to clarify our view of the subject.

That some change has taken place in the opinion of physicians as to what constitutes a suitable case is suggested by the marked increase in this method of treatment, as shown by the records of the Royal Prince Alfred Hospital. From 1914 when I induced pulmonary collapse for the first time, till 1930 the figures for each year read 11, 6, 11, 1, 15, 0, 0, 4, 2, 2, 26, 23, 14, 85, 91. Either many more suitable patients are presenting themselves or physicians are taking a less conservative view than formerly regarding what constitutes suitability.

Artificial pneumothorax aims at causing collapse of and immobilizing a lung with the object of arresting advance and of promoting healing in inflammatory processes whether due to tuberculosis or other causes. It is also used to check intractable haemoptysis. In pulmonary tuberculosis, in addition to immobilizing the lung as a splint fixes a joint, it relaxes tension in the diseased area and in cavities and so promotes repair. Also by reducing the circulation through the active foci it diminishes the output of toxin and systemic poisoning.

So obvious are the benefits of this therapeutic measure that at first sight it would seem to have a very general application. When closely viewed its limitations become more apparent. In the first place, the operation, small as it is, has to be repeated frequently over a long period. It is useless to cause a lung to collapse, allow it to undergo

¹ Read at a meeting of the Section of Medicine of the New South Wales Branch of the British Medical Association on June 19, 1930.

partial expansion, to cause it to collapse again and so on. The lung must be made to collapse and kept continuously collapsed for at least three years if treatment has been undertaken for active disease. This involves operating from once a fortnight to once every month or two over that period. There is no means of determining beforehand how often refilling will be necessary. I have had patients who after the first few fillings have not required recompression for three months, while others for many months require a filling once a fortnight.

Inducing collapse and then abandoning it generally results in the lung becoming adherent to the parietal pleura, effectually preventing subsequent renewal of treatment. It is evident, then, that this form of treatment should not be undertaken lightly.

In determining the suitability or not of a case for treatment one of the first decisions to be made is whether the doctor and patient are in a position to continue the treatment regularly and punctually over this long period and whether the treatment can be carried out in surroundings equal to those the patient would enjoy if it were not necessary to have the fillings done. To carry out efficient treatment it is necessary to check each step by screening the patient. Without this aid treatment is so much handicapped as to raise the question of its justifiability. Routine filling every three weeks is commonly practised. While effective in many cases, it may not insure continuous collapse, it fails to reveal the presence of fluid, unless relatively considerable, the occurrence of adhesions and the need for varying pressures in filling. In no case should the first filling be done without the information given by skiagram and screen.

The next question to decide is: is the lesion from its situation suitable for collapse therapy and are its severity and activity such as to justify a long and exacting form of treatment in place of relying on climatic and general measures?

The most suitable patients for treatment are those in whom the disease is strictly unilateral. Such patients are rare and form a very small percentage of those consulting us for pulmonary tuberculosis. By the time they come under observation the disease is almost always present on both sides.

If there is any involvement of the opposite side, it must be strictly limited in extent and should be quiescent as far as can be determined by clinical and radioscopic means. My experience is that when active disease is present on the non-collapsed side, even if slight in extent, it generally lights up and sooner or later determines relapse. Only when the lesion in the more extensively affected lung has resisted general measures and is obviously progressing, is collapse therapy justified in the presence of a focus in the opposite lung. Of six patients in whom slight involvement of the sounder side was present and in whom artificial pneumothorax was induced, three are dead, one is doing badly, one who had pneumothorax produced for haemophysis while he was improving, is well, one with subacute infec-

tion is still under treatment, doing well. All, with the exception of the last, were patients who had failed to respond to general measures.

To cause alternate collapse of one and then the other lung at a few months' interval in patients with bilateral involvement seems to me of doubtful value in the light of our knowledge of how long it takes to secure arrest when one side only is involved. It may be argued that alternating collapse temporarily decreases the output of toxin and so helps to increase the patient's resistance. It can equally be held that it throws extra stress on the non-collapsed focus and causes greater blood flow through it with corresponding increase in toxæmia. Any improvement occurring in such cases can well be attributed to causes outside the collapse.

Having decided that the case is anatomically suitable, the next question concerns the activity of the lesion and the prospects of cure without collapse treatment.

The lesion must be active. To compress a fibrosed and quiescent lung insures good statistics, but is an unjustifiable procedure. This question of activity is one of the most difficult points in the whole problem. Some infections are apparently so benign and tend so readily to arrest on general lines that one does not feel called on to submit the patients to a long and tedious treatment. Others are so obviously acute and toxic that it seems futile to waste time before commencing compression.

Physical signs alone are no criterion. All of us have met marked physical signs in old arrested cases and have seen patients without physical signs in whom the radiographer has demonstrated extensive disease. Radiographs of the chest are a great help, but cannot be implicitly relied on. One sees many patients in whom the films suggest marked activity and a bad prognosis, whose disease becomes arrested so rapidly that doubt must be cast on the interpretation of the shadow. Interpretation of the same plate by different radiographers and clinicians varies greatly.

The usual toxic symptoms—fever, wasting, anorexia and rapid pulse—are important. When present, they do not in all cases necessarily arise from the pulmonary lesion, but may originate in foci elsewhere. In doubtful cases it is wise to watch for a time, gauging the effect of rest and exercise, before finally deciding on the degree of activity.

The presence of tubercle bacilli in the sputum even in an afebrile case denotes the breaking down of lung tissue and warrants collapse therapy.

Where fever and tubercle bacilli are absent but cough and sputum are present in a unilateral case with considerable infiltration and fibrosis, decision is more difficult. It may be held that the condition is quiescent and treatment gratuitous. On the other hand, it may be urged that complete arrest takes a long time and that fibrosis is favoured by collapse.

Should pneumothorax be induced in early slightly active cases?

Theoretically, compressing and inactivating the lung is the best treatment. But it must be remembered that collapse therapy is only one factor in treatment. In sanatoria it can be carried out readily and its early use is indicated. In private life it involves so much expenditure of time and money as greatly to restrict its utility. If it involves denying the patient the benefit of change and climate, it is not justified, unless these methods have failed or the patient is precluded from availing himself of them.

My own practice has been not to operate unless convinced of the activity of the lesion and of its resistance to general methods of treatment. This attitude has been dictated by the expense, inconvenience and long duration of the treatment. Were such treatment easily and inexpensively available in suitable climatic surroundings, it might be used with success in much earlier and slighter cases. It is here that sanatoria and dispensaries equipped with efficient X ray apparatus could do so much. Little or no discomfort accompanies the collapse and the patient can continue his usual avocation after the more active stage is passed.

Of partial and alternating pneumothorax I have little experience. Partial collapse is advocated on the ground that where much activity exists complete collapse may result in a large discharge of poison into the system in the same way that excessive absorption may occur in operating on a hyper-secreting goitre. I have not seen this occur. Though it is wise not to cause full collapse of the lung on the first occasion, collapse, to be of value, must be as complete and constant as possible, not a partial and daily varying quantity.

In favour of partial collapse is alleged the strain on the sound lung. If the lung is sound, the strain does not matter. If it contains an active focus the whole question of suitability arises. Such juggling introduces so many variables that reasonable deduction is difficult. Improvement can well be quite independent of our efforts.

The presence of a large effusion may be an indication for collapse therapy. The fluid is removed, air is substituted and the collapse continued.

The objections to this procedure are two. In the first place, in the absence of a skiagram of the lung taken before the effusion occurred, we are ignorant of the amount, if any, of lung involvement. If we know there has been an active focus present prior to the occurrence of effusion, continuation of collapse by air pressure is indicated. In the absence of proof of lung involvement we may subject the patient to unnecessary treatment. In the second place, it is often extremely difficult to maintain collapse in these cases. Fluid reaccumulates to a greater or less degree and the lung tends to creep up under cover of the effusion, becoming adherent and obliterating the pleural space. I have found this to occur practically always in the few cases in which I have attempted it, so that treatment was sooner or later cut short.

The objection that collapse therapy may in these cases lead like a chronic effusion to permanent collapse, is in my experience remote.

One is unable to foretell the incidence or course of an effusion arising during collapse therapy in an ordinary case. Effusion may be slight or great, may persist long or quickly clear, may recur after tapping or tapping may arrest it.

The presence of fluid, unless excessive, seems to have little influence on the prognosis. Where great enough to require tapping and where it quickly reaccumulates, the outlook is less good. Of six patients requiring tapping, two are well, two died, two are under treatment.

The tendency to effusion and creeping of lung is one of the bugbears of treatment. I should like to know if anyone has experience of use of olive oil instead of air in such cases. The mere injection of a few cubic centimetres of "Gomenol" seems unlikely to be of value.

The presence of complications elsewhere must weigh in determining suitability or not for treatment. Tuberculous laryngitis is not a contraindication. The diminution of cough and general toxæmia secured by collapse has a very beneficial effect on the laryngeal condition. Of five persons treated in private practice in whom tuberculous laryngitis was present at the onset of treatment, one died. The remaining four are living normal lives.

Definite abdominal tuberculosis combined with a lung lesion connotes an invasion too great to be stemmed by collapse of a lung. Of course, the degree and nature of the abdominal involvement must be considered, but as a rule it should preclude operation.

Pronounced emphysema makes one hesitate. When one is in doubt, collapse can be cautiously effected and discontinued if respiratory inconvenience ensues. Cardiac failure contraindicates, but not mere valvular lesion. Whether pregnancy contraindicates is determined by the extent and activity of the lesion. In itself it does not necessarily do so. Kidney disease may or may not, depending on its extent. Diabetes does not contraindicate, provided it is amenable to treatment. Age, unless advanced or accompanied by marked arterial change or marked emphysema need not deter.

In recurring haemoptysis compression may give brilliant results. Where the bleeding is due to repeated rupture of a vessel in a cavity, collapse, maintained for twelve months, generally allows sufficient contraction and fibrosis to take place to arrest the haemorrhage permanently. It also gives a sense of security to the patient which is very helpful. That it does not always arrest haemorrhage permanently is shown by the case of a man who did not work for five years owing to recurring enormous haemoptyses which bled him white. His lung has been compressed now for sixteen years during which time he has been working. In the early stages the lung was often let up with resulting haemorrhage.

At present the lung has crept up and the question of phrenic avulsion arises, as he has recently begun to bleed.

It is often difficult to decide from which side the bleeding comes, and when a decision is made, pneumothorax sometimes is impossible owing to adhesions. In the absence of demonstrable cavity it is rarely of use.

Whether collapse can be effected can be determined only by trial. History and skiagram are both fallacious. One fails in apparently very suitable cases and succeeds where history, skiagram and physical signs all point to failure.

A factor of some importance in deciding whether or not to compress a lung is the patient's temperament. If the patient welcomes the treatment and is prepared to continue it regularly and efficiently, he will probably do well. The timorous, nervous, worrying, unwilling case does badly, though most patients quickly become accustomed to the slight discomforts entailed.

Collapse Therapy in Non-Tuberculous Conditions.

In certain non-tuberculous conditions the question of treatment by pneumothorax arises. In patients with cavity resulting from lung abscess it may be of value, but great care must be exercised in the selection of these cases.

In the first place it must not be forgotten that the majority of patients with lung suppuration, when expectoration is free, do well eventually if left alone. Intervention is not warranted in the earlier stages unless the cavity be close to the surface, when drainage, not collapse, is indicated.

When a chronic pus-containing cavity results and is situated in the mid-region of the lung, compression is justifiable. When in the root, compression will be ineffectual. When near the periphery, there is grave risk of converting a discharging into a closed abscess with fresh involvement of the surrounding lung and pleura, often with disastrous results. I have seen two cases of this sort in which the patients barely escaped with their lives.

This risk must also be considered in treating pulmonary tuberculosis with large peripheral cavities. Generally in these cases adhesions prevent collapse. Excessive pressure may cause intrapleural rupture and pyopneumothorax.

It is very necessary to differentiate chronic cavities due to abscess from those arising from long standing bronchiectatic dilatation. The former are due to necrosis of lung tissue or are the remains of a coughed up hydatid or empyema and tend to contract and undergo fibrosis. The latter are caused by pathological stretching of the bronchi and fibrotic changes in the surrounding lung. They do not tend to contract.

Collapse assists the fibrosis and contraction of an abscess cavity, but the bronchiectatic cavity is unaffected. While the lung is collapsed in a patient with bronchiectasis, sputum diminishes or ceases, but, when the lung is allowed to expand, the sputum recurs, as there is no tendency for the bronchiec-

tatic cavity to contract. Recognition of this pathological fact will prevent failure. There seems a tendency to resuscitate this form of treatment, though proved ineffectual years ago. Possibly good results might be obtained if patients with bronchiectasis were treated in a very early stage. As a rule the condition is old standing and chronic before relief is sought.

Recently a patient returned whose lung I had kept down for a year sixteen years ago for unilateral bronchiectasis. Offensive sputum recurred when the lung was allowed up. The patient is now a night officer on the railway and in good general health, but produces an ounce of offensive sputum when inverted.

In such cases if the infection is severe and causing much disability, phrenic avulsion alone or combined with thoracic collapse may be indicated, but only if the lesion is extensive and after prolonged postural and drug treatment has failed.

It has yet to be proved that permanent paralysis of one half of the diaphragm may not become later in itself a serious disability.

Phrenic avulsion and thoracic collapse, unlike pneumothorax, are irrevocable and justified only after grave consideration.

The advocates of phrenicotomy assume that regeneration of the nerve will take place in nine months. Are they justified in the assumption?

Summary.

To sum up, sixteen years' experience of this method of treatment suggests the conclusions that pulmonary collapse is indicated in pulmonary tuberculosis: 1. When the disease is strictly unilateral, is active and has failed to respond to general treatment. 2. When the disease is strictly unilateral and is so extensive and acute as to render arrest by other means improbable. 3. Where in addition to the lesion on the treated side, there is an arrested lesion on the other side. 4. When tubercle bacilli persist in the sputum in an apparently quiescent infection. 5. Where there is persistent haemoptysis and its source is probably a cavity in the affected side. 6. Collapse may be indicated in some quiescent fibrosing cases. 7. In some early cases where its practice does not prejudice general methods of treatment.

Collapse is contraindicated in the presence of an active focus, even if small, in the opposite lung (except as a forlorn hope).

Alternating and bilateral collapse are of doubtful value.

Pulmonary collapse is only one method of securing healing of a tuberculous focus. It should be used in conjunction with, not to the exclusion of, other means.

To insure arrest, collapse must be maintained for at least three years.

It should never be undertaken without the evidence of an X ray plate.

In pulmonary abscess it is of use in certain selected cases.

In chronic old standing bronchiectasis it is useless.

Results of Treatment.

I append the results of patients treated in private practice in whom pneumothorax was induced. Of those inductions done at the Royal Prince Alfred Dispensary I have not the figures. All infections except two were acute and had failed to respond to general treatment. All patients had in addition to artificial pneumothorax the advantage of climatic and the usual treatment by rest and graduated exercise.

Of sixteen patients with unilateral tuberculosis 14 are living, two are dead.

Of those living one is alive at the end of twelve and a half years after cessation of treatment, one at the end of nine years, one at the end of eight years, one at the end of two and a half years, one at the end of two years, one at the end of one year after cessation of treatment.

Eight are still under treatment; of these three have been treated by collapse therapy for two years and are doing well, one for one and a half years, working on a farm, one for ten months, one for six months, one for four months, one for two months.

Of the two who died, one remained well for five years and died eight years after cessation of treatment. The other died of haemoptysis two years after cessation.

Of six patients with bilateral disease, the infection being slight in the better lung, one is alive, still under treatment, well and working at the end of two years; one done for intercurring haemoptysis is well two years after cessation of treatment; one is alive and doing badly and is temporally unsuitable. Three are dead, one at the end of four years, one at the end of three and a half years, one at the end of two months. Except the first two patients, these were all suffering from acute disease and going down hill when treatment was undertaken.

Reports of Cases.

THREE CASES OF ACUTE BONE INFECTION.¹

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I AM reporting three cases of acute bone infection in the hope of creating a discussion which should be both interesting and instructive.

The subject of acute osteomyelitis is always of importance and cases of it are of immediate emergency. One is bound to meet these cases, if infrequently, and their comparative rarity leaves many of us inexperienced in their treatment. Because pyogenic infection, thanks to Listerism and better living conditions, has become less prevalent, these cases are not so common as formerly, the busiest surgeons probably only seeing a few examples in a year. Because of this, and because opinion in regard to the pathology and treatment is not settled, it is well that the subject be brought forward from time to time at such meetings as this.

Diversity of opinion is still great in regard to treatment, but there is a distinct trend towards more conservative methods of operating.

Two of my cases are typical of acute osteomyelitis as it commonly occurs; and I propose to read the reports of

these first, so that any discussion which may follow will be concentrated upon the problems that arise in the treatment of such patients.

The third case, of great interest and importance but rare, would, I think, be best considered by itself, as it presents quite different problems.

Case 1.

My first case is one encountered fortunately at a very early stage. A healthy boy, aged ten, whilst running, knocked the inner side of his right leg just below the knee. He took little notice of it until, a few days later, he felt some pain where he had received the knock. It made him limp, but he kept about and thought little of it. Still having a limp and beginning to complain of some pain, he was brought to me by his father, as the latter said, "just to please his mother," he himself thinking there was little the matter. This was on the morning of the fourth day after the injury. The boy walked smartly into my surgery with a slight limp and a smile on his face. On examining the leg there was a small circumscribed swelling upon the antero-internal surface of the tibia just below the knee, tender on pressure and giving a sense of deep fluctuation. A penny piece would have covered the swelling and tenderness was localized to that area.

Though the history was suggestive, the local signs were so slight that I was very nearly satisfying myself that the condition was merely a contusion, when the father remarked that the boy did not seem to be himself. On taking his temperature I found it to be 37.8° C. (100° F.). I persuaded the father to allow the boy to remain in hospital under observation. About 4 p.m. the patient was reported to have a temperature of 40° C. (104° F.). An enema and a sponging were given without reducing the fever and the boy now complained a good deal of pain. On examination the local signs had materially changed. The whole upper half of the leg was now definitely swollen and the tender area had extended a few inches down the shaft of the bone.

Operation was undertaken at once, a tourniquet being applied to the thigh. An incision down to the bone over the metaphysis showed no pus and a normal-looking bone surface. A drill was passed through the cortex about five centimetres (two inches) below the epiphyseal line. Its withdrawal was immediately followed by the welling up of dark venous blood. Another drill hole a little above this gave the same result—immediate appearance of blood. I was surprised and puzzled at not finding pus and, on examining the bone closely, noticed a little higher still and about eighteen millimetres (three-quarters of an inch) below the epiphyseal line a tiny spot of congestion, a mere speck, where I again applied the drill. This time the withdrawal of the drill was not followed by a flow of blood, but after quite an appreciable interval a bead of pus welled up. The advantage of the tourniquet in allowing these observations to be made should be noted. This area was then opened up and a cavity made in the bone, admitting the tip of a finger, appeared to include the suppurating area. This and the wound were filled with cold sterile vaseline and covered with dressings, and the leg nursed on a pillow between sandbags and covered by a cradle. I will refer again later to this method of filling these wounds with vaseline.

The subsequent course of this patient was uneventful. The boy went home with a discharging sinus and the usual thickening of the leg about the lesion. One or two small sequestra came away and when I saw the boy recently there was still a little discharge from the sinus, but the swelling of the leg was much reduced.

It is seldom that one is so fortunate as to meet such an early case and the demonstrating of the site of the original focus and other features are, I think, worth recording. The amount of swelling of the soft tissues that can result from such a small focus in the underlying bone is interesting and also the remarkable change that occurred in this boy's condition, both general and local, between 10 a.m. and late afternoon.

¹ Read at a meeting of the Victorian Branch of the British Medical Association at Bendigo on May 24, 1930.

Though some of these cases are fulminant and septicaemic from the first, most of them would prove as simple as this if advice were sought early enough and the significance of the earliest symptoms recognized.

Case II.

The second case is one met with at a fairly late stage. Nine days previously this boy of twelve hurt his leg rather badly. Whilst on a see-saw, his *vis-à-vis* (so to speak) deserted his post so that our patient came down with his leg under the beam. The upper part of the leg, including the knee, swelled quickly. Rest and bathing reduced this swelling in a day or two. Then the boy became ill, complained of pain in the leg and swelling recurred. He was feverish and at times delirious before I saw him.

On examination the whole leg from knee to ankle was swollen and red and there was fluctuation over the swelling. There was fever, but the boy did not look as ill as one might have expected. With a tourniquet applied to the thigh he was operated on immediately and a subperiosteal accumulation of pus over the antero-internal surface of the tibia was opened. Only for a couple of inches above the ankle was the periosteum not detached from the bone. The incision in the periosteum having been extended to the limits of the abscess, the question now arose as to whether the bone should be opened. The bone was not avascular, but of a mottled, pinkish hue, indicating that the bone was congested. For this reason I decided to be satisfied with drainage of the abscess for the time being and to open the bone later if the boy's condition did not improve. Free drainage was established by leaving the wound widely open and by leading a drain tube through the calf that would just reach the depth of the wound. The wound cavity was then filled with cold sterile vaseline and dry dressings applied over all. Steady improvement in the boy's condition followed and the wound cavity slowly filled in and healed, except for the usual sinuses.

He was allowed to go home and returned to the hospital some months later, when a sequestrum was removed which proved to be a long slender sliver of bone; it was easily removed after division into two pieces through a comparatively small opening in the involucrum. The boy is now strong, showing no disability and with the wound healed, except for a sinus leading into the upper metaphysis from which small sequestra have been discharged from time to time.

This last patient was operated on some months before the first—now eighteen months ago. Completing the operation, I was thinking of the painful dressings ahead of the little patient, if the usual gauze packing was used. I said to my colleague, Dr. Loughran, who was giving the anaesthetic: "I have a good mind simply to fill this wound with vaseline." He replied: "I read somewhere lately of someone in America who treats all his abscess cavities in that way." I thereupon laid in cold sterile vaseline with a flat instrument till the cavity was filled, covering everything with dry dressing. Subsequently each day fresh vaseline was buttered in as required to fill the cavity, the surroundings being cleansed and dry dressing applied as a covering. The wound healed as readily as possible and during the whole time the patient did not have one painful dressing; a great help, surely, to such a weakly, debilitated patient. There was never any bleeding and the patient watched the proceedings with interest. I thought the vaseline might leak through the drainage tube, but vaseline at body temperature keeps its semi-solid state. It blocked the tube, but drainage occurred along the track of it. As a matter of fact there was very little discharge and what there was simply seeped up at the sides of the wound and was more serous than purulent in character.

There is no doubt gauze is an insult to granulation tissue. It damages the delicate granulations, making them bleed and it encourages suppuration and increases the formation of scar tissue.

Filled with vaseline it is a pleasure to dress the clean, healthy-looking wound and to watch the granulations slowly filling the cavity.

This method of dressing is applicable to any abscess cavity which has been adequately drained, and I have applied it with complete satisfaction even to ischio-rectal abscesses. In these the vaseline soon works out of the cavity, but sufficient remains to cover and protect the granulations. All that is necessary is to open the wound gently once a day and pack in fresh vaseline.

It is very striking how these wounds will heal with a minimum of scarring. A few months ago a lady chopped off the top of her thumb cleanly, losing at least the distal one-third of the nail and the pulp beneath it. This was dressed by enveloping the end of the thumb in a thick lump of sterile vaseline carried on gauze and enveloped in wool and lightly bandaged. This was renewed daily at first and later every second day. It is hardly any exaggeration to say that the finger grew a new tip with a soft pulp and no trace of a scar. Only by comparing the two thumb nails is any shortening noticeable. I am quite sure that gauze dressings in this case, besides being painful, would have resulted in a scarred and deformed thumb.

After this digression let me return to the consideration of the bone cases.

Comments on Cases I and II.

I have little comment to make on the first case. The periosteum was still attached to the bone and where this condition obtains it is wise in drilling the bone to disturb it as little as possible.

If in an early case pus is not met with in spite of having drilled the apparently affected area, culture of the bone dust will usually show infective organisms and in the course of twenty-four hours frank pus will appear.

Beekman¹⁰ writes:

If in drilling the bone, pus, under slight pressure, is obtained without blood, the probability is that the medullary circulation at this point is destroyed. If a few drops of pus are evacuated followed by free bleeding, the probability is that the infection has not produced marked destruction within the bones.

Such a case as the second presents a number of problems. Where pus is present under the periosteum, can it ever be due to a primary osteoperiostitis without any focus deep in the metaphysis? The most generally accepted opinion appears to be that in children at any rate it is always secondary to a metaphyseal focus. Granting this, is it necessarily associated with infection of the marrow and the depths of the bone? Some think so and teach that where pus is present under the periosteum, no operation is complete without opening up and thereby draining the medullary cavity.

Others claim that when marrow infection occurs the sequence of events is metaphyseal infection, then periosteal infection, which leads to infection of the marrow by way of the Haversian canals at different levels along the shaft.

Based on such a pathology, the only treatment required would be adequate drainage of the subperiosteal abscess. There are even those who, believing that the periosteal infection is secondary to medullary infection, argue that subperiosteal suppuration indicates drainage of the infected marrow and that free incision of the periosteum is all that is required in the way of operative treatment.

And this may be true, for it has been observed that when pus, deep seated in origin, breaks through into the soft tissues or into a joint and is drained, the infection in the bone goes no further.

Quoting Beekman again:

When a joint has been involved early in the disease it should be drained. The position of the bone lesion in most cases is impossible to place and consequently cannot be drained. We have found, however, that in the majority of such cases the drainage of the joint is sufficient.

On the other hand there appears to be little harm in opening the medullary cavity so long as curetting *et cetera* is avoided; for, again quoting Beekman:

Bones have been drilled and no lesion found. The medullary cavity has been opened to find it normal and pus later has been discovered in another part. In such cases the normal tissue exposed at first has not been infected by the pus from the second operation.

As regards what is adequate in the way of drainage, here again we may perhaps be more conservative than we usually are which leads me to a further quotation from Beekman's article:

It has been found that in cases in which the medullary cavity has been involved, that incisions, such as described for early cases, placed at either end of the shaft of the bone, will usually successfully drain the infection within the shaft. . . . Since we have given up the more radical incisions, the period of time until healing is complete, in individual cases, has apparently been shorter; the sequestra have been smaller in size; the bone, when finally healed, has shown less sclerosis; and there has been a smaller scar and more soft tissue covering the surface of the bone.

After a fairly extensive search of the more recent literature dealing with the subject of osteomyelitis, one is definitely impressed with the view that the operative treatment in these cases is tending to become more and more conservative and that the radical operations advised in the past should not be practised, as simple drainage gives the best results.

The best and most comprehensive articles I came across were those of Fenwick Beekman,⁽¹⁾ of New York, and R. B. Wade,⁽²⁾ of Sydney.

A method of treatment recently introduced by H. W. Orr⁽³⁾ is startling in its originality. He applies it to infected fractures as well as to cases of haemogenous bone infection. He adequately drains the infected area, packs the wound with sterile vaselined gauze and covers this with a layer of dry gauze. He then applies a plaster casing to the limb, including at least the joint above and below the lesion, and employing a spica or even a double spica in some cases. There is no window over the wound. This is left on for six weeks. Then it is cut down, removed, the wound repacked and a fresh plaster applied. This is left on for a month, when the wound will usually be healed. Absolute fixation of the limb and avoidance of frequent dressings and irritating antiseptics, he says, prevent sequestration. One wonders not only at the extraordinary results claimed for this treatment, but also what the condition of the limb is, as regards function of the confined joints and muscles when the last plaster is removed.

Nevertheless, F. J. Gaenslen⁽⁴⁾ expresses his opinion of this treatment thus:

The Orr method of petrolatum pack and the plaster cast in the after treatment is advocated. The petrolatum pack is not a plug, but acts as a huge drain, the discharge seeping out between the petrolatum and the surface of the wound. It also supplies that optimum of pressure conducive to rapid healing.

The plaster cast prevents meddling, reinfection, and the breaking down of Nature's barriers in defence.

Aside from this, the freedom of pain and the absence of dread of repeated dressings must make the method popular, leaving out of consideration entirely the convenience of the surgeon who will find the method time saving.

This treatment may well change the outlook for these patients; and for those who dare not yet venture to undertake such unusual methods let me recommend the vaseline dressing I have described. I can claim for it most of the advantages of the Orr method but not the wonderful results.

The following extracts which I have noted, are of interest.

Finger pressure continued for some minutes over the ends of the long bones giving increasing pain is a pathognomonic sign of bone infection.

The bright red bone marrow becomes at first chocolate coloured when infected.

Absence of the epiphyseal plate makes spread of infection to the joint more likely in adult cases.

More recent investigators believe that the periosteal vessels anastomose with the lateral branches from the medullary vessels.

Factors accounting for the metaphysis being the seat of the original focus: First, lateral terminal vessels in the juxta-epiphyseal tissue are arranged in loops or hairpin bends in which the circulation is slowed. Second, in bone as a rule there is very active phagocytosis, but in the metaphysis phagocytosis is poor. Third, the ligaments of the neighbouring joint are attached to this region and consequently strains are apt to produce mild trauma.

A Brodie's abscess represents an early stage of osteomyelitis which has been walled off by the local resistance of the individual's tissues.

Cotton states:

Often I have seen what I thought was a wholly dead fragment yield only a scale of sequestrum and then go on to do its part in repair. And Bancroft from experiments and the study of clinical cases found that it was impossible in an early stage of acute osteomyelitis to tell at what point the separation between living and dead bone might take place; and further he came to the conclusion that much of the bone which was apparently destroyed acted as a scaffolding in which new bone was formed . . . And a further conclusion has been drawn that the presence of a sequestrum is important to the part in preventing deformity, as it acts as a splint until the formation of a firm involucrum has taken place.

If after wiping the bone there is no pus seen oozing from innumerable points or from a fistula in the bone, if there is no soft spot to be seen, and no droplets of fat, drain adequately and wait twenty-four to thirty-six hours before proceeding further.

Taking part in a discussion⁽⁵⁾ on Dr. Beekman's paper Dr. Carl Burdick states:

The radical methods of several years ago in which a large part of the cortex was removed have been discarded, and the simpler methods of drainage are now giving satisfactory results without the destruction of a large amount of normal bone and periosteum.

Dr. Seward Erdman draws attention to the rôle played by foci, for example, antrum infection, in cases of recurring osteomyelitis.

Dr. Charles E. Farr:

In children the healing and absorbing powers are very great. Lesions of considerable extent will disappear under rest, sunlight and good food. Once the tension has been relieved by suitable incisions in the soft parts, supplemented with bone removal if deemed necessary, nothing is lost by giving plenty of time for Nature to exert her powers.

A noticeable custom with American writers is the use of a capital N in writing the word Nature—surely a worthy conceit.

Case III.

The third patient, a poorly nourished, delicate looking boy of thirteen, was admitted to the Kyneton Hospital on May 16, 1929. He was very ill, toxic and delirious; in fact the night before his admission he had to be held in bed. He had a high fever and a rapid pulse. His right hip was painful on movement, tender and the upper half of the thigh was indefinitely swollen. The right knee was swollen, hot and tender. There was a small scab on the dorsum of the right foot and some tender enlarged glands in the right groin.

Five days previous to admission a small pustule on the right instep broke and was bathed and dressed. The next day the boy seemed ill and feverish and the following day he complained of pain between the hip and knee. His temperature was found to be 40.5° C. (105° F.) and that night he became delirious. Pain in the right knee came on the next day.

For a week after admission the boy was very gravely ill, extremely irritable and often delirious, passing his urine into the bed. In addition to the hip and knee one wrist became swollen and painful. There were also complaints of pain in the back and shoulders and a reddened swelling appeared for a short while on the back of the neck. There was some albuminuria and a systolic bruit appeared at the mitral area.

The condition was evidently a severe septicæmia and during the first week the boy was not expected to live.

However, his fever began to subside, the affected wrist and knee cleared up, the hip remaining painful when he was disturbed. The hip affection was always the most prominent local condition, but there appeared no abscess or other indication for operative intervention. The right leg was kept fairly comfortable on pillows between sandbags and cradled.

The boy was convalescing satisfactorily and suffering little pain, when one morning on examining the hip I lifted the knee very gently. There occurred a horrible creak, audible to those standing around the bed. A fracture had obviously occurred and I was so dumbfounded that I omitted to apply extension to the leg as was obviously indicated. The next morning on coming to examine the hip I found that a dorsal dislocation had occurred.

Under an anaesthetic this was reduced and extension applied. A week later, however, it was noticed that the dislocation had recurred. This was again reduced, the adductor tendons being tenotomized, and extension again applied in a slightly flexed and abducted position.

Though I felt satisfied that the dislocation was reduced, there seemed to be something unsatisfactory about the position of the great trochanter. A few days later what felt like the head of the bone was found lying on the *dorsum ilii* under the gluteal muscles.

Because it necessitated transport out of the hospital, an X ray examination had not been made, but now that my mismanagement had resulted in as much damage as could occur, this step was undertaken. Apparently on the journey the dislocation recurred and the X ray picture showed the femur quite intact in the position of a dorsal dislocation. This was obviously wrong, as was shown when I cut down upon the detached piece of bone which proved to be the head of the femur. It was removed from the bed of granulation tissue in which it was lying, accompanied by a little pus. The wound was drained and the dislocation again reduced and extension reapplied.

The wound healed in about ten days when a Thomas's splint was fitted, fixing both legs, the affected one in a slightly flexed and abducted position. It appeared to me that the most one could hope for was an ankylosed joint with some abduction to counterbalance the inevitable shortening. The Thomas's splint was kept applied for several months, the flexion of the right hip being gradually reduced and the left leg piece in time removed. The boy was then allowed about on crutches and when the Thomas's splint was finally discarded it was found that instead of ankylosis there was fair movement at the hip. Today the leg promises to be quite useful. There is 3·5 centimetres (one and a half inches) shortening and he has just acquired a cork soled boot with which he gets about quite well with the aid of crutches. He can stand without his crutches and could probably walk without them, but is still a little afraid. He can sit in a chair quite naturally.

The sequence of events in this case appears to have been as follows. A septicæmia accompanying an osteomyelitis of the acetabulum with fracture of the posterior rim from injudicious manipulation. Then consequent dorsal dislocation occurred. Later separation of the epiphyseal head occurred during reduction, leaving the head behind on the *dorsum ilii*.

I found little reference to this condition in my search through the literature. The possibility of dislocation occurring when the hip is involved is mentioned in a few instances without explanation.

A paragraph from an article by D. Lewis,¹⁰ of Baltimore, however, seems to meet the situation. This draws attention to the possibility of a dorsal dislocation when osteomyelitis occurs, as it may do, in the upper and posterior rim of the acetabulum which is supplied by an artery that may be closed by an infected embolus.

As some recompense for reporting a case which does me no credit I hope this report and any discussion which it may originate, will be of service to some of you here today.

References.

¹⁰ F. Beekman: "Acute Haematogenous Osteomyelitis: Relationship of its Pathology to Prognosis and Treatment," *Annals of Surgery*, Volume LXXXVIII, August, 1928, page 270.

¹¹ R. B. Wade: "Acute Osteomyelitis in Children," *THE MEDICAL JOURNAL OF AUSTRALIA*, March 2, 1929, page 263.

¹² H. W. Orr: "Listerism, Properly and Improperly Applied in Treatment of Infections of Bones and Joints," *The American Journal of Surgery*, Volume IV, May, 1928, page 465.

¹³ F. J. Gaenslen: "Osteomyelitis," *American Journal of Diseases of Children*, Volume XXXVIII, 1929, page 1342.

¹⁴ D. Lewis: "Acute Osteomyelitis," *Journal of the American Medical Association*, Volume XCII, March 9, 1929, page 783.

¹⁵ Discussion of Dr. Beekman's paper, *Annals of Surgery*, loco citato.

Reviews.

CLINICAL EXAMINATION.

It would seem that the author of "Demonstrations of Physical Signs in Clinical Surgery"¹ has been a keen student and admirer of the late C. B. Lockwood whose clinical lectures, although delivered nearly a quarter of a century ago, still continue to charm and repay their readers. In the introductory chapter is found the following quotation: "If it is a question of doubt in diagnosis, you may often observe that one man solves the doubt when the others could not, and the way in which one man happened to solve it is this: he applied to the diagnosis of the case some method of examination which the others had not applied."

Mr. Bailey has gathered together and presented with accurate description and clear illustration the methods of clinical examination that have proved of value to him. His efforts have been so successful that a second edition, revised and enlarged, has been called for within three years of the appearance of the first. All the well-known clinical tests and signs are demonstrated as well as many others that have not yet become standard, although probably of equal helpfulness and accuracy.

Differential diagnosis receives consideration in those conditions and they are many, in which such diagnosis is closely associated with the elicitation of certain physical signs. Such an association is entirely natural and welcome. An appendix detailing and tabulating the causes of enlargement of the liver and the spleen appears less spontaneous and a little self-conscious in its intrusion. And it must be confessed that the real pleasure of reading through this book, so admirably conceived, written and produced, was ever so slightly marred by the meeting with the "howling" of a child and a "snag" in diagnosis.

The book will be found of real value alike by student, practitioner and teacher.

¹ "Demonstrations of Physical Signs in Clinical Surgery," by Hamilton Bailey, F.R.C.S. (Eng.); second edition, revised and enlarged; 1930. Bristol: John Wright and Sons Limited. London: Simpkin Marshall Limited. Royal 8vo, pp. 279, with 306 illustrations, some of which are in colour. Price: 31s.

The Medical Journal of Australia

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VOCATIONAL GUIDANCE.

WITH the recognition of the responsibility of the medical practitioner in the prevention as well as in the cure of disease has come a realization that the incidence of disease is determined by many factors. Among these the environment of an individual and his reaction to that environment are of great importance. The study of industrial hygiene and all that it implies is concerned with this aspect of preventive medicine. Industrial hygiene has to do with the effect of the occupation on the individual, mainly from the point of view of the elimination of conditions likely to be detrimental to his health. As an antecedent to this question must come that of the suitability of the individual for the occupation. A man who is like a round peg in a square hole cannot be either contented or happy; he will be of little use from the economic point of view; he will be likely to suffer from mental or physical disturbances of functional origin. The choice of a suitable occupation for the individual has been studied for many years by the industrial psychologists; vocational guidance, as it is called, has been developed along sound and practical lines.

Discussion of the subject is opportune in view of a recent description by Dr. A. H. Martin in *The*

Australasian Journal of Psychology and Philosophy of June, 1930, of the methods used at the Australian Institute of Industrial Psychology at Sydney. Dr. Martin is Honorary Director of the Institute; he is also Lecturer in Psychology at the University of Sydney. Those who present themselves at the institute for examination range from about fifteen to sixteen years. They are generally accompanied by a parent or guardian and an attempt is made to ascertain the reason for seeking advice, the possibility of the subject undertaking higher or university education is investigated, inquiry is made into the general economic status of the parents and any facts that may have a relevant bearing on the physical fitness of the candidate are elicited. It is significant that no mention is made of any candidates having been sent to the institute by medical practitioners. A list of occupations on which the subject is required to exercise his preferences, is then presented. Psychological tests are applied. The tests are arranged so as to give alternation of types of mental activity to prevent monotony and to reduce fatigue to a minimum. The tests comprise the United States Army Alpha test, Kohs's block test, a clerical test to reveal clerical ability and a power to concentrate on studies, a Stenquist construction test, tests of motor ability and of spatial sensory judgement and finally a salesmanship test. When all the tests have been made, the findings are used in the same way as the physician uses the results of blood counts, blood pressure readings and cardiograph tracings. The general intelligence test reveals the general limitations of a candidate and it is possible to observe whether he belongs to one of three types, the clerical, the sales or the constructive type. Definite advice may then be given. The work at the Sydney Institute has been founded on work carried out in Great Britain in 1926 for the Medical Research Council and the National Institute of Industrial Psychology by Burt. According to figures quoted by Dr. Martin, Burt found that only 2·1% of persons following vocations recommended by psychologists were dissatisfied; 42·4% of those following vocations dissimilar to those recommended were dissatisfied. It is not proposed to describe the tests used or to discuss their individual value. It is intended to draw attention to the fact that work

of this kind is valuable, that it is being done effectively in Australia, that the work done should receive recognition and be extended.

Vocational guidance may be looked at from two points of view. One is that of the employer who is concerned with his turnover and (if he is wise) with the contentment of his employees. The other point of view is that of the mental hygienist, and medical practitioners are or should be included in this category. With the purely economic side medical practitioners are not concerned, except as members of the general community affected by economic standards. It is evident that selection of an occupation for an individual and the practice of industrial hygiene are closely allied. The industrial psychologist is, as Dr. Martin has pointed out, concerned mainly with the mental equipment of the candidate and vocation certainly depends in predominant measure on this aspect, but the investigation is not complete unless a careful physical examination has been made by a medical practitioner. Medical practitioners can, if they will take the trouble to study the subject, combine the physical and the mental examination. Unfortunately there is an extraordinary apathy to anything savouring of such an abstract subject as psychology; and yet, knowing little or nothing of normal mental processes, most medical practitioners would scout the suggestion that they were for this reason incapable of judging abnormal mental states. If they will not take the matter up for themselves, they must at least acknowledge what has been and is being done. They can recommend the proper psychological examination of young persons who stand on the threshold of manhood and womanhood. We would go further and state that they fail in their duty if, there being any doubt as to fitness, they consent to a haphazard choice of occupation when it is possible to obtain an adequate psychological examination.

Current Comment.

CHRONIC ULCERATIVE COLITIS.

THE term chronic ulcerative colitis is applied to ulceration of the colon not due to enteric fever, dysentery, tuberculosis or malignant disease. A bacteriological origin was first assigned to it by

Jex, Blake and Higgs in 1909; among the factors mentioned by them were *Bacillus coli*, *Escherichia coli*, *Bacillus proteus vulgaris*, *Bacillus pyocyanus* (*Pseudomonas aeruginosa*) and streptococci. Many other observers have investigated the disease and a great variety of other pathogenic organisms has been held responsible. Rolleston in 1923 expressed the view that the normal inhabitants of the intestine become pathogenic after injury to the mucosa of the colon, caused by dietary and other deficiencies. The precise causative agent has remained unknown, but the condition is generally deemed to have an infective origin. At the same time Larimore in 1928 advanced the view that vitamin deficiency is either the cause or prevents cure of the ulceration. He reported material benefit from a diet rich in vitamins. Tomato-juice, peaches, lettuce and cod liver oil were particularly useful.

In 1928 De Bere isolated diplostreptococci from the rectal lesions and by intravenous injection in animals produced lesions resembling those of human beings. J. A. Bargen in 1924-1925 failed to find dysentery bacilli or amoebae. In smears from the colon he found two predominating organisms, a Gram-positive diplococcus and a Gram-negative bacillus. The Gram-positive diplococcus (a diplo-streptococcus) was found in 80% of infections in pure culture from the early lesions, from the depths of chronic ulcers and occasionally from distant foci in the body. By intravenous injections into rabbits and dogs of the diplococcus or mixed cultures of the two organisms lesions were produced like those of ulcerative colitis in the human subject. Louis A. Buie (1926) was convinced that Bargen's diplococcus was the cause, but A. F. Hurst was sceptical.

Bargen now gives a review of investigations concerning the aetiology of this disorder and gives extensive details of his own investigations.¹ From the lesions of the bowels in patients the Gram-positive diplococci were so numerous that frequently other bacteria were not seen. These organisms also were found in predominating numbers in primary cultures in dextrose brain broth. It was believed that growth of the causative organism might occur in this medium, since it afforded a gradient of oxygen tension, whereas only the more saprophytic organisms or those not sensitive to oxygen might develop on blood agar and in other ordinary mediums. Further, localization in the colon might occur following intravenous injection of the primary mixed culture and the causative organism might be isolated from the tissues of animals in which lesions developed. The animal would be used as an artificial culture medium for selection of the organism that could do specific harm. If pure cultures of the organism, injected similarly after rapid subculture, produced similar lesions, such an organism could justly be considered as being a probable aetiological factor in producing chronic ulcerative colitis. Positive results were established

¹ Archives of Internal Medicine, Chicago, April, 1930.

early in the investigations. The diplococci as a rule were rather closely fused in pairs, almost merging into a chain of four cocci, but never more than four in a group. The organism is slightly larger than a pneumococcus and lancet-shaped. The appearance of its colony is in striking contrast to that of the enterococcus of Houston and McClay (1916). It differs from *Streptococcus faecalis* in not usually fermenting mannite. Bargen gives a detailed account of its characteristics and of its differences from other organisms. It probably belongs to the streptococcus group and the *viridans* species. With this organism rabbits were immunized to produce a diagnostic serum. Agglutinins and precipitins were determined in the serum of these rabbits. Horses also were immunized. Rabbits injected with pure cultures developed diarrhea, often with blood and mucus. Even extensive ulceration of the large intestine and severe haemorrhages followed. Lesions were more extensive near the rectum. Rarely were lesions found in other organs. Other strains of streptococci isolated from the bowel did not produce such lesions. Dogs injected similarly with the diplococcus showed even more striking lesions. An organism in all essentials like this diplococcus was isolated by blood culture from patients with fulminating ulcerative colitis and at necropsy the organism was isolated from the heart's blood and from the lesions in the colon. Removal of tonsils and of infected teeth of patients caused exacerbations of the disease. Diplococci, in all essentials like those isolated from rectal lesions, have been recovered from tonsillar abscesses and from periapical abscesses of teeth and cultures of these injected into animals have produced lesions like those described. These organisms were agglutinated by the immune rabbit and horse serums. Cook has induced periapical infections in dogs by inoculating the pulp canals with diplococci isolated from the blood and mesenteric glands of rabbits in which haemorrhagic colitis developed after intravenous injections of diplococci isolated from the lesions of patients with chronic ulcerative colitis. Later chronic ulcerative colitis developed in a number of these dogs. Bargen does not state whether he recovered the organism in pure culture from the lesions produced by him in animals. Koch's postulates have not been satisfied. At the same time, however, he has presented striking evidence in favour of a causal relationship of these organisms to chronic ulcerative colitis. In view of Larimore's work it should be concluded that vitamin deficiency, particularly deficiency of vitamin A, is probably a predisposing or contributing factor.

TREATMENT OF SYPHILIS.

MODERN methods of treatment of syphilis have resulted in a great change in the clinical manifestations of the disease as seen in both general and hospital practice. At the same time it has been held that modern therapy may lessen the patient's

defensive reaction, particularly if the treatment is early and inadequate. Some workers believe that some treatment, though inadequate, is better than none. Others have put forward the view that modern treatment shortens the period of time elapsing between the appearance of primary symptoms and the manifestation of late stages, such as *tabes dorsalis* and general paralysis of the insane. Claude B. Norris has recently made a study of one hundred and ninety-two patients suffering from relatively late syphilis, untreated and inadequately treated.¹ He holds that much of the adverse criticism in regard to modern treatment consists of statements of impressions. The object of his paper is twofold: to record his observations and to throw light on the advantages and disadvantages of modern treatment. Unfortunately he makes no distinction in most of his tables between those patients who received inadequate and those who received no treatment. He states that he found no significant difference between the two. He does not indicate what he regards as adequate treatment. The number of patients who received no treatment was 149 and those whose treatment was inadequate was 43. Probably the most important fact in his series is the statement that in 42.1% of all cases (eighty-one patients) the late manifestations took the form of neurosyphilis; cardio-vascular syphilis accounted for the symptoms of seventeen persons, fourteen had visceral syphilis, six had skeletal and nine ocular syphilis. Neurosyphilis is notoriously difficult to treat, hence the need for early diagnosis is obvious. Of the patients in the series 38.4% of men and 18.8% of women gave a history of chancre and 61% of all patients had a knowledge of infection. The figure given by Norris as reported in the literature in regard to knowledge of infection is 22%. The figures gathered from patients cannot, of course, be accepted as entirely correct, but even if a 20% error be allowed for wilful intent to deceive, it is difficult to understand how such a large body of persons could be ignorant of the presence of syphilitic infection. The findings on application of the Wassermann test in Norris's series are important. Of eighty-six patients 63% gave a Wassermann reaction in the spinal fluid and 93% gave a reaction in the blood. The high percentage of reactions in the blood is explained by Norris as due to the disposition in clinics not to accept a patient as syphilitic unless his blood yields a positive reaction.

In discussing Norris's results it is difficult to draw any definite conclusions as to the comparative value of modern treatment. It is, of course, obvious that incomplete treatment will be followed by syphilitic lesions at a later date. Absence of treatment will, as Norris states, most likely result in grave damage to the visceral, vascular and nervous systems. The factor of most importance is the Wassermann test. Since it appears to be possible that many persons are unaware of syphilitic infection, the Wassermann test should be more widely applied.

¹ Archives of Dermatology and Syphilology, June, 1930.

Abstracts from Current Medical Literature.

BACTERIOLOGY AND IMMUNOLOGY.

Experimental Poliomyelitis.

R. W. FAIRBROTHER AND E. WESTON HURST (*Journal of Pathology and Bacteriology*, January, 1930) report the results of their investigations in an attempt to follow by experimental passage of various regions of the brain and spinal cord, at different periods after inoculation, the path of transmission of the virus of poliomyelitis. A histological study of the central nervous system at the same periods and a consideration of the symptomatology in monkeys were also undertaken. Virulent strains of virus with which the incubation period varies within very narrow limits, were used. At varying periods after intracerebral inoculation into healthy monkeys the animals were etherized and portions of the nervous system were removed for passage; from these a 5% emulsion was prepared and used in doses of 0.5 cubic centimetre. With the cerebro-spinal fluid 0.5 cubic centimetre of undiluted fluid was made the standard dose. For the intranasal work the virus was introduced into the nares either by submucous injection or by scarification of the mucosa and subsequent packing with wool soaked in a 5% emulsion. The spinal cord both in man and monkeys is the most reliable source of virus and in experimental work this statement applies whatever the route of inoculation. Following intracerebral inoculation, virus was detected in the cord at the first appearance of symptoms, but not on the preceding days and all parts of the cord are involved at approximately the same time. At the site of inoculation the virus tends to diminish in activity. The cerebro-spinal fluid takes no demonstrable part in transfer of the virus to the cord. It was found that the distribution of the virus in the cortex is irregular and inconstant and the authors formed the opinion that this is not a favourable site for development or even preservation of the virus. The results of the experiments of intranasal inoculation showed that the virus does not readily reach the central nervous system from the nose. The following conclusions were arrived at: (i) After intranasal and intracerebral inoculation in monkeys poliomyelitis spreads from above downwards, the various levels of the cord becoming involved more or less simultaneously. Owing to the greater individual susceptibility of the anterior horn cells and particularly those of the lumbar region, paralysis usually appears and later becomes complete, first in the legs; the clinical findings are thus no guide to the path of entry or manner of spread and development of the disease. (ii) Spread of the infection to the brain

stem and cord occurs by way of the axis cylinders and this appears to be the route usually taken to other parts of the central nervous system. Meningeal spread is, however, possible and probably always plays a part in the local dissemination of the infection round the site of the inoculation. (iii) Meningitis is therefore not the primary lesion of the disease which begins as a primary degeneration of nerve cells accompanied by inflammation in the interstitial tissues. (iv) Virus is present in greatest amount in those regions in which nerve cell degeneration is particularly severe, that is to say, in the spinal cord and brain stem; where nerve cell degeneration is slight, as in the cerebral cortex, in spite of the existence of numerous foci of inflammation, the virus is found inconstantly. (v) The cerebral cortex is not a favourable site for survival of the virus which tends within a few days to disappear altogether from the site of inoculation. (vi) If the virus travels chiefly by way of the axis cylinders, its appearance in the cerebro-spinal fluid would not be expected, nor, in fact, is it found there except on rare occasions.

Hodgkin's Disease.

ÉLISE S. L'ESPÉRANCE (*Journal of Immunology*, February, 1930) reports the result of the study of a case of Hodgkin's disease. The patient was a female child, aged eight years. She had been quite healthy until one month after a routine tonsillectomy. The temperature ranged to 38.9° C. (102° F.), there was progressive loss of weight with vomiting and epistaxis. The cervical lymphatic glands became enlarged and increased in size for four months. Histological examination of an enlarged excised gland confirmed the diagnosis of Hodgkin's disease. Later the child developed cough, spleen became enlarged and X rays revealed enlarged mediastinal glands. The blood picture showed a moderate anaemia with leucopenia. The child died eight months after the onset of the illness. At post mortem examination a mass of enlarged glands was found in front of the great vessels of the neck and the mass continued down on both sides of the aorta to the root of the lung. These glands were firm and presented on section a smooth light brown surface. The spleen weighed five hundred grammes and was slightly irregular with numerous small greenish nodules. Enlarged glands were also found in the neck along the vertebral column, about the aorta and in other parts. Several showed small, greyish, opaque areas located in the centre of the gland. Microscopical examination of the lymph glands revealed the histological picture of typical Hodgkin's disease. The spleen was dotted with granulomatous areas in which were found reticular endothelial cells, lymphocytes and myeloid giant cells. Emulsified material from the glands was inoculated into two guinea-pigs, two normal chickens and one rabbit. The

guinea-pigs had been treated previously with an injection of killed human tubercle bacilli. One of the guinea-pigs died fifty days after inoculation with an atypical tuberculosis involving practically the whole lymphatic glandular system. Cultures on egg media from these glands gave a moist pinkish growth of non-acid-fast tiny granules. This culture was inoculated into another guinea-pig and produced after five months extensive tuberculosis of the liver, spleen and lymphatic glands. The second guinea-pig survived one hundred and forty days and autopsy revealed a massive tuberculosis of bronchial, cervical and other lymphatic glands with focal granulomata in lungs, spleen and liver. Histologically the lymphatic glands showed characteristic Hodgkin's disease. Cultures yielded a pure growth of acid-fast bacilli with many features of the avian type of tubercle bacillus. This organism when inoculated into other guinea-pigs, produced a similar lesion and from them the same strain was isolated. The rabbit inoculated with the original emulsion remained alive nine months after inoculation. This, the author holds, appears to support the avian nature of the strain. Of the chickens inoculated one gave evidence of early avian tuberculosis when killed five and a half months after inoculation. Cultures yielded acid-fast bacilli in pure growth. Emulsions from one of the lesions were inoculated into two chickens. One lived for five months and at autopsy showed advanced tuberculosis.

Cellular Reactions in Tuberculosis.

MARION B. SHERWOOD (*Journal of Immunology*, December, 1929) undertook a series of experiments with a view to disclosing certain facts with reference to the occurrence and the activity of certain cells in animals infected with tuberculosis. The peritoneal exudate following intraperitoneal injections of virulent tubercle bacilli was examined in both allergic and non-reacting animals. The author's conclusions were as follows: (i) The cell changes in the peritoneal exudate of guinea-pigs intraperitoneally infected with tuberculosis are definite and orderly. These changes in non-allergic animals are: Polymorphonuclear leucocytosis, monocyte, a variable lymphocytosis with persistent though variable monocyte. The changes in the allergic animals are: Polymorphonuclear leucocytosis, monocyte accompanied by lymphocytosis, monocyte overshadowed by lymphocytosis. (ii) There is a more pronounced phagocytosis of relatively avirulent tubercle bacilli by the polymorphonuclear leucocytes of the allergic animals than by those of the non-allergic animals during the first two hours following infection. (iii) Phagocytosis of relatively avirulent tubercle bacilli by the polymorphonuclear leucocytes of the peritoneal exudate may lead to a loss of viability of these organisms.

(iv) Phagocytosis of the tubercle bacilli by the monocytes is initiated earlier in the non-allergic animal than in the allergic one. (v) The cellular responses in guinea-pigs both with regard to the time of appearance and the phagocytic activity of the different cell types is dependent upon the allergic state of the animal. (vi) The degree of phagocytosis by the polymorphonuclear leucocytes is also dependent upon the type of organism present.

HYGIENE.

Diphtheria Prevention in Brookline.

F. P. DENNY (*New England Journal of Medicine*, April 10, 1930) describes a campaign against diphtheria which was begun in 1923 in Brookline, a town of 40,400 population, of which 7,200 were children under fifteen. The average annual number of cases of diphtheria since 1905 had been 52, with 2.2 deaths per annum. Following parental consent, 2,674 children, representing 56% of the school population, were tested by the Schick method and given toxin-antitoxin treatment if susceptible. In six subsequent years 3,441 additional children were treated, making a total of 6,115. In the subsequent years certain children who were susceptible on first examination, were retested and, if necessary, retreated with toxin-antitoxin. In certain cases this was repeated during three years and six of 105 children were still found to give a reaction to the Schick test after three retests. In addition to school children 455 children of preschool age were treated at the Community Health Centre during the seven years and it is believed that many other young children have been privately treated in their homes. The failure of the parents in many cases to consent appears to be the main obstacle in eliminating diphtheria from the community. The annual incidence of diphtheria before and since the inauguration of the campaign is shown in a graph. Since 1923 no deaths occurred in Brookline and the annual total of infections has steadily fallen from 45 in 1923 and 16 in 1924 to three and five in 1928 and 1929 respectively. Of all affected persons since 1923 none has had protective treatment, with two possible exceptions. One of these exceptions concerns a possible mild missed infection and the other a case of scarlet fever in which *Bacillus diphtheriae* was obtained in culture from the throat.

Garden Cities and Public Health.

THEODORE CHAMBERS (*Journal of State Medicine*, January, 1930) stresses the value of a health association during the days of early development of a town. As chairman of such an organization at Welwyn Garden City he describes the organization from the inception in 1922 when the population numbered less than 1,000,

to the present when 1,200 of the population of 7,000 are members. The main activities of the association are: Maternity and child welfare, district nursing, first aid and hospital work. A detailed review of these activities is given. The general standard of health is excellent and is reflected in the vital statistics. The death rate for a period of nine months ending December 31, 1927, was 5‰ as compared with 12.3‰ for the whole of England and Wales. The infantile mortality rate in 1927 was 18.1 per thousand births as against 69 for England and Wales. In 1928 the rate was 6.17 only. The work of the health association in linking up with the normal public health work has helped to produce these results.

Miners' Nystagmus and Incapacity for Work.

J. W. TUDOR THOMAS (*Journal of Industrial Hygiene*, January, 1930) has made a clinical study of 512 cases of miners' nystagmus. He analyses his series with regard to occupation, age and incapacity for work, correlating the results with the condition of vision of the victims and the state of the nervous system. The onset of recurrent attacks and the period of incapacity are taken into account. It is concluded that defective vision does not influence the onset of an attack or the average period of incapacity. After an attack resumption of similar work means the definite risk of recurrence in three or four years and the average period of incapacity is found to be somewhat longer than in first attacks. The average age of onset is about forty-one years and the average period spent underground before incapacity twenty-seven years. Age increases the length of incapacity. Myopia appears to have some influence in delaying complete recovery. The onset may be determined by illness or injury. Miners' nystagmus presents certain differences from the nystagmus due to certain nervous complaints. The wearing of corrective glasses for eye defects does not influence recovery from nystagmus.

The Carbon Monoxide Content of the Blood of Steel Mill Operatives.

C. J. FARMER AND P. J. CRITTENDEN (*Journal of Industrial Hygiene*, December, 1929) have examined samples of blood taken from fourteen employees of a steel company who were exposed daily to inhalation of carbon monoxide. The samples were taken on cessation of work at 4 p.m., at 8 a.m. and again on cessation of work the following day. The blood of one further employee not exposed to the same atmosphere was taken at the same times as a control. The samples were placed in a refrigerator for transport and analysed within forty-eight hours of being taken. The carbon monoxide, carbon dioxide and oxygen contents as well as the haemoglobin percentages were estimated and the total carbon monoxide combining

capacity of each specimen of blood was either determined by direct analysis after saturation with illuminating gas or calculated from the haemoglobin content. This factor was found to vary in individuals and was used to determine the percentage of saturation in each sample. The amount of carbon monoxide in the first samples taken was found to vary between 2.5% in a stove cleaner to over 11% in a stove tender. The percentages for stove tenders, furnace men and gas washers was uniformly higher than that found in stove cleaners. The control case gave a blank result. At 8 a.m. the following day the average percentage of carbon monoxide found was 2.11 and at the third examination 7.01, a somewhat higher figure than the average of the first samples. Inquiry into the histories showed that persons giving the highest readings sixteen hours after contact were those who had been frequently gassed at work. The retention values were higher than would be expected, but it is pointed out that previous experimental work with carbon monoxide has rarely shown readings more than four hours after inhalations. Apparently recreation and exercise in fresh air facilitate elimination. The authors suggest that the great retention of carbon monoxide may be the result of acute poisoning over extended periods of time.

The Determination of Dust in Air.

L. C. MCNAIR AND J. F. HIRST (*Journal of Industrial Hygiene*, December, 1929) have described a method for the rapid determination of dust in air. The method is an adaptation of the sugar-tube method described by Fieldner and others (United States Bureau of Mines) in 1921. A measured volume of air, usually five to ten cubic feet, is aspirated through five grammes of cane sugar in a Gooch crucible with small holes. The sugar is then dissolved in about twenty cubic centimetres of water and washed together with the occluded dust into a specially constructed centrifuge tube. This tube is eighteen centimetres long and two centimetres in diameter and has three centimetres of thick walled tubing of one millimetre, specially selected as to uniformity, joined to the bottom. The junction must slope gently. In order to prevent inaccuracies through the sealed end of the tube, 0.01 gramme of red lead suspended in alcohol is first centrifuged in the tube. The sugar solution is then poured in and centrifuged for two minutes or more at two thousand revolutions per minute. The height of the column of dust in the five tubes is then measured, preferably by microscopical means. Measured quantities of dust are then similarly treated and the amount of dust in the sample estimated by comparison. Results approximating those from gravimetric methods have been obtained by this method and, after standardization of the tube, the process can be completed in half an hour.

Special Articles on Diagnosis.

Contributed by Request.

IV.

DYSMENORRHEA.

NORMAL menstruation is a more or less regularly recurrent phenomenon which, either concurrently with the active menstrual discharge or immediately preceding or succeeding it, occurs without pain or disturbance of the balance of the general health. Such a process may well be termed eumenorrhœa, while any marked deviation therefrom is dysmenorrhœa. In a considerable proportion of women, unmarried and married, menstruation is a trial, attended with every sort of suffering, ranging from slight aches and pains up to the most intense agony with more or less serious disturbance of the nervous system.

Normal menstruation demands: (i) a normally developed and physiologically conditioned generative apparatus, (ii) healthy general nutrition, (iii) harmonious balance of all the functions (including endocrine balance). If these demands are not met, there will be disturbance of the menstrual function by pain or other neurosis.

Dysmenorrhœa being a symptom, diagnosis, to be of practical value, must have reference to causative factors which may be found in one or other of the following groups: (i) Abnormal conditions of uterus, Fallopian tubes, ovaries; (ii) pathological systemic conditions (faulty metabolism, lack of endocrine balance). And since marriage and child-bearing have their pathological sequences, the dysmenorrhœa of the virgin necessarily has certain differences from that of the married or parous woman.

I. Dysmenorrhœa in the Virgin.

(A) Uterine Dysmenorrhœa.

Dysmenorrhœa in the virgin is evidenced by pain which may precede the discharge for a day or longer and is relieved by the first twenty-four hours of the flow, occasionally recurring before its final cessation. The pain is spasmodic or cramp-like, a uterine colic. It may radiate to the lumbar region and become unbearable, in its intensity resembling labour, and often accompanied with clots. Such pain is associated with (i) acute flexions of the uterus, generally anteflexion; (ii) cervical stenosis; (iii) hypoplasia.

Every anteflexion or retroflexion is not a cause of dysmenorrhœa; but the small undeveloped uterus, acutely anteflexed with the so-called pinhole os, is undoubtedly at the seat of much dysmenorrhœa in the young unmarried girl (the type that is relieved, if not cured, by (i) marriage and childbirth, (ii) stem treatment with appropriate endocrine administration).

In such cases it is not necessary to assume the presence of an inflammatory process. The premenstrual congestion causes pelvic discomfort merging into pain with general disturbance until the flow is established. The diagnosis with an anaesthetic is made by bimanual recto-abdominal palpation.

(B) Ovarian Dysmenorrhœa.

Ovarian dysmenorrhœa is evidenced by pain definitely referred to the ovarian region on one side or the other, often both sides, of a stabbing or darting nature, extending to the hips or even down the thighs. A dull, aching feeling in the ovarian site may precede the acute pain. The breasts are often tender and painful. Increased congestion of the ovary, hypertension, a thickened *albuginea* making the rupture of a Graafian follicle difficult, are factors of this dysmenorrhœa.

In many of these cases there is thickening of the ovarian stroma with retention cysts. Such a chronic interstitial oophoritis in the young girl may be the result of extension from an inflamed appendix or it may be tubercular in origin.

The palpation of enlarged tender and prolapsed ovaries makes a diagnosis possible. On the other hand, one often

finds, on opening the abdomen, "cystic ovaries" where there is no history of ovarian dysmenorrhœa and in many cases one fails to detect by palpation the pathological condition of the ovaries. General depression and mental disturbance are common in these types. The so-called intermenstrual dysmenorrhœa (*Mittelschmerz*) is probably associated with this variety of dysmenorrhœa, the cause being in the ovary—in a state of hypertension.

(C) Membranous Dysmenorrhœa.

In the rare form, known as membranous dysmenorrhœa, the whole or part of the uterine mucous lining may be thrown off at menstruation. If complete, the "sac" is easily recognizable—triangular with the tubal openings at the angles. Microscopically the appearance is that of an interstitial endometritis.

The pain in these cases is intense, like a miniature labour, and only ceasing when the uterine contents have been expelled. The diagnosis should not be difficult, but it is possible to mistake this condition for an early abortion.

(D) Dysmenorrhœa from Tubal Inflammation.

Inflammatory affections of the tubes (tuberculous or other infections) may be a source of painful menstruation; there are generally adhesions. The writer has seen long-standing dysmenorrhœa disappear after the removal of a "chronic" appendix, with involvement of the mesometrium.

(E) Dysmenorrhœa due to Neoplasms.

Neoplasms of uterus and ovary (myoma, ovarian cyst) in the majority of cases are associated with dysmenorrhœa.

(F) Idiopathic Dysmenorrhœa.

The dysmenorrhœa of the three types already described (A, B and C) is more or less of mechanical or obstructive origin. There remains a large group in which there is no evidence of abnormalities of uterus or its appendages. On the other hand, faulty nutrition (anaemia, chlorosis and disturbed nervous function, tendency to neuralgia, hysteria, mental irritation) figures largely in this group. Careful inquiry must be made into the question of thyroid and pituitary balance and the diagnosis will be helped by reference to the amount of the flow in individual cases (oligomenorrhœa, menorrhagia). Dysmenorrhœa of these types (nervous, nutritional) is found in school girls who are intensely studious, and factory girls with little outdoor exercise, and among the poorly nourished.

II. Dysmenorrhœa in the Married Woman.

The conditions referred to under the above headings described (A, B, C, D, E, F) may all be found in the married woman. With some the disability is diminished, in others intensified and again there may have been no dysmenorrhœa previous to marriage. A dysmenorrhœa following soon after that event is usually that of endometritis of infective origin. The pain begins some days before the flow which is increased. There may be in addition salpingitis. The uterus is tender to palpation.

With child-birth an important factor is introduced. The damage to the pelvic content caused by puerperal sepsis is reflected in the disturbance of the menstrual process.

Diagnosis must be made with reference to subinvolution, prolapse, "fixed" retro-displacements, adhesions, inflammatory affections of tubes and ovaries—in a word, the diagnosis of dysmenorrhœa in a parous woman is an epitome of gynaecology. Even to the conservative mind the "surgical" element overshadows the non-surgical.

Summary.

A wide range of causes makes the diagnosis of an individual case of dysmenorrhœa a question of careful consideration. Judgement must be exercised as to the necessity of making a recto-abdominal or vagino-abdominal examination in a young unmarried girl.

Nothing can be more unscientific, nothing more harmful than curettage of a young virgin uterus for dysmenorrhœa with some slight leucorrhœa on the score that the patient

has a "catarrhal endometritis." Scar tissue, a damaged cervix and sterility are not uncommon sequelæ.

In view of the increasing number of preparations, for the most part proprietary, for the relief of dysmenorrhœa, it may be not inopportune to point out that the habitual use of such sedatives, without attempt at diagnosis, may mask a symptom of serious underlying causes.

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British Medical Association News.

SCIENTIFIC.

A MEETING OF THE VICTORIAN BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held at Bendigo on May 24, 1930.

Surgery of Access.

DR. L. S. KIDD read a paper entitled: "The Surgery of Access for the Use of Radium in the Pelvis" (see page 107).

DR. J. NEWMAN MORRIS said that he had recently visited the Mayo Clinic where by the "broken dose" method of treatment by radium doses of 700 to 3,000 milligramme-hours were being used. The results compared favourably with those obtained by the Wertheim operation in the hands of Mr. Victor Bonney.

DR. KAYE SCOTT thanked Dr. Kidd for his paper which gave an adequate conception of the attempts which were being made to reach pelvic malignant conditions, and particularly their metastases, with radium.

In Melbourne the time had not yet arrived in which malignant disease of the cervix was regarded as wholly to be treated by radium. Operable conditions were still operated on and practically only patients with inoperable and late conditions came to the radium clinic. Only one operable tumour could be recalled in the clinic in the last two years and that had proved to be an adenocarcinoma. These tumours appeared to be radio-resistant and this case had progressed to a fatal termination.

Bonney had shown that 60% of his operable tumours were free from metastases. Of all his patients 40% were cured. There were thus 20% of patients with no apparent metastases who died of cervical cancer following operation.

As operation was still performed, a strong appeal was made for the use of prophylactic vaginal radium therapy and deep X ray therapy to the gland areas following Wertheim's operation. Only by this means could this 20% of failures be reduced. There was no doubt that on the metastases of cervical cancer deep X ray therapy had a marked effect.

In Melbourne no attempt had so far been made to radiate gland areas by radium transperitoneally following vaginal radium therapy. Wherever possible the use of buried needles into the primary malignant growth was favoured, long needles being passed through the lateral fornices in an attempt to catch any infiltration or metastasis in the parametrial tissues. With this technique recurrence in the lateral fornices was rare, but in several cases recurrent masses had formed in Douglas's pouch, involving the uterus and rectum and thus demonstrated a definite line of spread in this direction. All patients with cervical and uterine malignant disease were given deep therapy as a routine.

Prostatic malignant disease was another pelvic condition in which exposure would enable radium to be used in suitable cases. The difficulties here were early diagnosis and the tendency of these growths to metastasize to the pelvic bones at a very early stage. In all cases a radiograph of the pelvis should be taken, but one or two cases in which X rays had failed to demonstrate bony involvement at an early stage, had been met with.

The use of gold wire radium emanation implants or "seeds" as were now available would make a vast improvement in the technique of radiotherapy of the prostate. Where formerly radium needles had been buried into the

prostate following perineal exposure, seeds could be used. The presence of the radium needle threads necessitating incomplete closure of the perineal wound was a very great predisposing cause of sepsis. One case was known in which a septic sinus persisted for several months. The use of seeds which could be placed in and around the prostate in considerable number, procured a much more uniform radiation of the malignant field and allowed a much wider radiation of the periprostatic tissues which might be involved in malignant infiltration. There was no necessity to remove the seeds and the wound could be closed with consequent lessening of septic risks.

Rectal cancer at the Melbourne Hospital clinic presented a difficult problem from the radium point of view. Practically all the growths presented were advanced and as such probably had glandular metastases which passed beyond the range of transsacral surgical exposure. In these cases it was probably better to give deep therapy only. Only once had Neumann and Coryn's exposure been performed at the hospital. Here the growth had passed beyond the limits of exposure. The mortality of surgical removal was high and it was considered that in early cases the exposure of the growth for radium therapy would cause less risk to the patient. Good results were being reported from abroad in these cases.

In reply Dr. Kidd referred to the method of introducing long radium needles into the fornices *per vaginam* and said that Donaldson used this method and alleged that no injury occurred to ureters or veins. Dr. Kidd, however, had seen one fatal result due to perforation of the uterine vein causing a large haematoma. This technique was inferior to that of Heyman, as it gave 10% less successful results. Donaldson admitted this and showed a tendency to return to surface application by means of operation. There was no record of cancer having occurred in a patient treated with radium for a premalignant condition (*menorrhagia et cetera*) or after the efficient amputation of the cervix for early malignant disease. By opening the abdomen radium rays could not reach the extreme limits of the growth from the cervix without attacking the glands directly. Deep X ray therapy should be used after intraabdominal radium treatment.

Rheumatoid Arthritis.

DR. D. W. NEVILLE read a paper entitled: "Rheumatoid Arthritis" (see page 109).

DR. J. NEWMAN MORRIS said that the conception of the inference of the sympathetic nervous system in rheumatoid arthritis was an important one. In patients exhibiting overaction of the sympathetic system, such as those described by Dr. Neville, with poor circulation, blue hands *et cetera*, relief could sometimes be given by the operation of sympathetic ramisection.

DR. IVAN MAXWELL said that patients suffering from rheumatoid arthritis were usually immune from allergic manifestations. In Dr. Maxwell's opinion a deficiency of vitamins sufficient to cause serious disease in adults was unlikely to occur in Australia. In regard to the aspect of endocrine upset, the only endocrine extract probably absorbed from the bowel was thyroid gland extract. In regard to the administration of calcium salts, it had been found that large doses of calcium lactate, 4.8 grammes (eighty grains), given by mouth before breakfast were followed by a curve of increased blood calcium comparable to a blood sugar curve.

In reply Dr. Neville said that if allergy connoted sympathetic under-activity, Dr. Maxwell's objection was valid; but if it included sympathetic over-activity with vagal deficiency, as in rheumatoid arthritis, the objector would not hold.

Scarlet Fever.

DR. J. J. SEARBY read a paper entitled: "A Recent Epidemic of Scarlet Fever" (see page 112).

DR. H. MCLOINAN said that he very much appreciated the account of an interesting epidemic. It was to be expected that the three patients who had previously suffered from scarlet fever, should present only symptoms of tonsillitis or sore throat with no rash. In such cases there

was an immunity to the toxin of scarlet fever which was the cause of the rash. Patients who did not react to the Dick test and who were therefore immune to the scarlet fever toxin, could contract the disease in the throat and act as carriers to susceptible persons. The occurrence of pneumonia in patient number three during the fifth week was probably to be looked upon as a coincidence rather than as a complication of the scarlet fever.

Acute Infection of Bone.

DR. W. R. GROVES read a paper entitled: "Three Cases of Acute Bone Infection" (see page 123).

Glioma of the Eye.

DR. T. C. KER showed a female patient who had been admitted to hospital on August 29, 1929. She had been transferred from a private hospital in order to undergo radium treatment. Excision of the eye had been performed for glioma of the eye and at the time of admission a moderate amount of discharge from the eye socket had been present. On September 17, 1929, a wax model of the eye socket had been prepared and two five milligramme tubes of radium had been buried in the wax, one above the other, at right angles to the vertical plane. The mould had then been inserted into the socket, covered with rubber glove tissue. Radium had been continued until September 24, 1929, the total extent of treatment being 1,600 milligramme hours.

Ulcer of the Lip.

DR. W. J. LONG showed a man, aged sixty years, a labourer, who had been admitted to hospital on December 9, 1929, complaining of a sore on the middle of the lower lip which had been present on and off for the previous fourteen years. During the past twelve years he had been treated by at least seven doctors. He had generally been given a white ointment and this had soothed the lip for the time being; apparently it had sometimes caused complete healing. Ten years previously he had been advised by a lay person to paint the lip with spirit of salts. The guttering in the lip from the resulting burn still remained. The patient's previous history was good; he had always been strong and healthy. He had smoked since he was seventeen years old; he had always smoked a pipe, but never a clay one. There was no history of venereal disease. His father had died of bronchitis at seventy-seven years of age. His mother had died at eighty years of age. Of two brothers, one had been killed in an accident and the other was alive and well at sixty-seven. One sister had died under an anaesthetic given for an operation on an eye. Examination had revealed a large ulcerous mass in the middle of the lower lip, indurated all round and firmly bound down. Glands had been palpable on both sides of the jaw. Severe pyorrhœa had been present.

Under chloroform and ether anaesthesia Dr. Long made a curved incision across the front of the neck at the level of the hyoid bone, the incision extending from one sternomastoid muscle to the other. Flaps consisting of skin, platysma and *fascia colli* had been dissected upwards and downwards. Submaxillary and submental glands on both sides of the neck had been dissected out. Small rubber tubes had been left in the corners of the wound. Deep structures had been united with interrupted catgut sutures. The skin had been clamped with Michel's clips. Eight radium needles had been inserted into the growth—five one-milligramme and three two-milligramme needles. These had been left buried for eight days, the total dosage being 2,112 milligramme-hours. A definite reaction had occurred with a certain amount of pain for some days. The glands had been examined by a pathologist and no evidence of malignant disease had been discovered.

Fracture of the Skull.

DR. MORRIS JACOBS showed a male patient, twenty years of age, who had been admitted to hospital on February 10, 1930, with a history that while riding on the top of a railway truck, he had been struck by an overhead bridge. On admission he had had two cuts over the parietal region, pieces of brain escaping. A large depressed area had been

seen under the skin. The right eye had been very bruised and swollen and the patient had been vomiting blood. He had been unconscious and restless. Operation had been performed. A large flap of skin from the right parietal had been turned back. An extensive fracture of the right parietal bone had been found; the depression had been raised. A piece of bone had been removed and the orbit which was dislocated forwards, had been replaced. Haemorrhage had been observed from the longitudinal sinus. The patient's condition after the operation had been very poor and he had been restless. His condition had improved until March 6, 1930, when a fluctuant swelling over the right maxilla had been opened and pus had been obtained.

On March 20, 1930, the right orbit had been examined by X rays and a report had been received that lateral and antero-posterior films revealed an extensive fracture commencing just above the left orbit, going up for 2.5 centimetres (one inch) and then taking a right angle turn to the right and proceeding horizontally across the right frontal bone to join up with another fracture. The second fracture commenced at the upper limit of the right orbit and proceeded upwards cranially almost parallel to the right temporo-parietal suture; the lower portion of the right frontal bone and the medial 2.5 centimetres of the left frontal bone were practically enclosed by the line of fractures.

The patient still had a draining sinus from over the right maxilla. He had a lowering of the right eye, but otherwise he appeared to be normal.

Fracture of the Pelvis.

DR. JACOBS also showed a male patient, aged sixty-nine years, who had been admitted to hospital on May 16, 1930. He had fallen down a cellar on to his left side. He had been unable to move his left leg after the fall and had complained of pain in the left hip joint. On springing the pelvis he had complained of severe pain in the region of the left hip. No shortening of the left lower limb had been present. X ray examination of the pelvis and the upper third of the left femur had been made. No injury to the latter had been found, but there had been a splitting fracture commencing in the base of the left acetabular fossa and pointing to the left upper quadrant of the radiographic basin of the pelvis. Anatomically this spicule would be situated somewhat lower down in the pelvis, probably about the level of the ischial spine. Treatment had consisted in the application of a tight binder and rest in bed.

Persistent Headaches.

DR. A. J. BOTHAMLEY showed a female patient, aged thirty-four years, married, who had been admitted to hospital on April 29, 1930, complaining of frequent severe headaches extending over a period of seven years. The patient had suffered from measles twenty-seven years and pleurisy twenty-two years previously. The patient had five children alive and well, their ages being 11, 7, 4, 3 and 2. She had had no miscarriages and no still-births. Her husband was healthy. There was no family history of tuberculosis. One sister suffered from fits and was in a mental hospital.

The headaches had been frequent and severe during the previous seven years. They began in the frontal and extended to the occipital region. The headaches were increasing in severity. She had neither abdominal pain nor discomfort after meals. She had vomited on the day of her admission to hospital, but not since. On her admission the patient had complained of constipation, but five days later had complained of diarrhoea. Her menstrual periods had been regular until one month previously. During the previous month she had had two periods; the first had lasted for seven days and after a week's interval a slight loss, lasting for fourteen days, had occurred. At times the patient had a slight yellowish discharge from the vagina. She was a pale-faced young woman who lay comfortably in bed; she answered questions intelligently. Her temperature was 36.1° C. (97° F.), her pulse rate 88 and her respiratory rate 22 in the minute. Her eyes reacted sluggishly to light and they also reacted to

accommodation. The tongue was clean and tremulous on protrusion. The teeth were all artificial. The pulse had a good volume and was regular. The systolic blood pressure was 110 and the diastolic pressure 70 millimetres of mercury. The urine was acid and clear. On examination of the heart the apex beat was found to be inside the nipple line; the sounds were clear and regular. The lungs were clear. The abdomen appeared normal and no abnormality was detected on vaginal examination. Examination of the eyes revealed no abnormality. The cerebro-spinal fluid was normal. The Wassermann test yielded no reaction. The biceps and triceps jerks were hyperactive and equal on both sides. The right knee and right ankle jerks were more active than the left and there was what appeared to be a false clonus of the right knee. The plantar reflexes were both flexor in type. The cranial nerves were normal and sensation was normal. X ray examination of the skull had been carried out with stereographic films. In every film calcification shadows were seen extending down from the inner table of the skull downwards into the interior from the middle sagittal suture at two points. There was a single shadow in the region of the lambda and a series of small ones just behind the bregma. The posterior ingrowth extended down for about three millimetres. It was considered quite possible that the inward projections were causing an irritation of the meninges and thus were possibly the cause of the headaches. Treatment consisted in the administration of iodide of potash and the use of aspirin, phenacetin and caffeine powders as required.

Purpura Haemorrhagica.

Dr. Bothamley also showed a patient who was suffering from *purpura haemorrhagica*. This history will be published in a subsequent issue.

Osteoarthritis of the Knee Joint.

DR. W. E. HARRISON showed a male patient, aged fifty-one years, who gave a history of attacks of "gout" commencing at the age of fourteen, affecting the left metatarsophalangeal joint of the big toe. At thirty years of age he had commenced to get recurring attacks of "gout," involving the joints of both knees, ankles, toes, elbows and fingers. He had suffered from pleurisy with effusion thirteen years previously on the right side with aspiration of fluid and another attack four years previously, involving the left side. The present trouble in the left knee seemed to date back about ten years previously when the knee became acutely painful and swollen. He had been treated for gout and after three months in bed had apparently recovered. Five and a half years later, four and a half years before the present demonstration, he had had a similar attack with another three months in bed.

When Dr. Harrison first saw the patient in October, 1928, he had been able to walk, but had had a good deal of pain in the joint; it had been slightly swollen, but no signs of fluid had been present. The joint which had been slightly flexed, could not be further flexed through more than a few degrees; the internal condyle of the tibia had been enlarged. A plaster case had been worn for several months, but when this was left off the joint had become more swollen and more painful as he began to walk about. Subsequently three fluctuating swellings had appeared, one on the outer aspect of the joint, one on the inner aspect just below the level of the patella and one in the middle of the popliteal fossa. Each of these had been incised and drained of thick pus. The opening in the popliteal fossa was injected with bismuth, iodoform and paraffin paste, the course of which was shown clearly in an X ray film to reach the medial condyle of the femur. Although the patient was now back in bed again, the joint had not been immobilized for reasons which Dr. Harrison said he need not explain, so that eventually the patient had developed a subluxation of the joint. For the last few months he had been in bed with traction on the leg by weight and pulleys. He had come to the hospital that day in an old plaster case as a temporary support. The sputum had contained acid fast bacilli three months previously. The Wassermann test applied to the blood had yielded no reaction.

Dr. Harrison showed X ray films of the joint and read the reports of the radiographers.

On January 30, 1929, films of the left knee joint had shown: (i) Some fuzzy exostoses at the sides of the bones, (ii) a definite diminution amounting in places to almost absence of the normal articular gap, (iii) slight erosion of one of the condyles of the femur. The general appearance had suggested an osteoarthritic condition of the joint.

On May 10, 1929, films of the left knee, the lower half of the femur and upper sixth of the leg had shown some ragged condition of the condyles of the femur and haziness round the joint near the patella and also in the lateral portion of the joints. The X ray examination had suggested an arthritic condition with very slight bony proliferation and extensive involvement of the soft tissue. There was no definite indication of the underlying cause. From the appearance it was quite possible for it to have a tuberculous basis.

On October 2, 1929, antero-posterior and lateral films of the left knee, including the lower half of the femur and upper third of the tibia and fibula had shown rarefaction of all the bones, gross erosion of the cartilages and some lipping. There was diminution of the articular spaces and commencing ankylosis. Just near the lateral epicondyle of the femur was a rounded shadow, probably a detached osteophyte or sesamoid bone. The appearance suggested osteoarthritis rather than tuberculosis.

On December 18, 1929, antero-posterior and lateral films of the left knee after injection of bismuth, iodoform and paraffin paste had shown a sinus which commenced on the surface at the middle popliteal fossa and which extended caudally and then took an acute turn cranially to reach the posterior part of the medial condyle of the femur where there was a definite erosion of the posterior rounded portion of the medial condyle, about six millimetres (a quarter of an inch) depth of bone being eaten away. The lateral film suggested that the joint surfaces were not widely, if at all, affected, but the injected material obscured the field in the antero-posterior picture so that it was impossible to give exact information at this point.

On February 8, 1930, a film of the chest had shown a flocculent mottling of the middle half of the right lung and of the left subapex and apex, becoming denser at the actual apex. The right apex and subapex showed a fairly even, moderately heavy clouding. The bases were fairly clear and there was no evidence of any cavity formation or fluid collection. The appearance of the lungs strongly suggested apical pulmonary tuberculosis.

A film of the left knee showed still further erosion of the proximal end of the tibia with the original area of erosion on the posterior aspect of the condyle of the femur still showing. Since the last film the joint had become more disorganized and dislocation of the tibia had occurred in a lateral rotational direction. Practically all the opaque substance injected had disappeared. The continued progress of the lesion with the presence of marked destruction of bone without any evidence of proliferation together with the apical pulmonary tuberculosis infection had been regarded as making a diagnosis in this case definitely a tuberculous infection of the knee joint. The appearance had suggested that the most that could be hoped for was a cessation of the progress of the bony lesion with fixation of the knee joint and probably to arrest the lesion surgical excision of the knee joint would be required which would produce a shortened, stiff leg, if successful.

Dr. Harrison also showed a female patient, aged twenty-one years, who had had an attack of pneumonia four years previously. Five years previously she had fallen on the railway line and injured the right knee; fluid had been withdrawn from the knee and after six weeks' rest in bed she had been able to return to her work as assistant railway gatekeeper. She had had subsequent attacks of pain in the joint without obvious swelling and between the attacks, although the joint did not feel right, she had been practically free from pain. Dr. Harrison had seen the patient for the first time on May 19, 1928. Several days before this the knee had suddenly given under her and she had fallen over. The joint had been uniformly swollen, very painful and flexed almost to a right angle. About two weeks later, when the leg was straight and

the acute symptoms had subsided, her limb had been put up in a plaster case. She had been getting about on crutches most of the time, but without bearing weight on the affected leg. She was free from pain in the joint except for an occasional twinge. The Wassermann test had yielded no reaction. Two months previously there had been numerous acid fast bacilli in the sputum. On two occasions in the past twelve months she had had febrile attacks with active signs of lung trouble during which she had rested in bed. The X ray appearances of the chest were suggestive of pulmonary tuberculosis. Dr. Harrison showed the skiagram of the knee and drew attention to several areas of rarefaction and erosion of the joint surfaces.

Periurethral Infection.

Dr. Harrison's third patient had suffered from a suppurative periurethral infection. This report will be published in a subsequent issue.

Multiple Sclerosis.

DR. D. W. NEVILLE showed a male patient, aged twenty-one years, a gardener and casual worker, who had been admitted to hospital on November 14, 1929, complaining of difficulty in walking, due to lack of control of the right leg, for seven days and hazy vision in the right eye for eighteen months. His gait was ataxic. General examination revealed no other abnormality. Examination of the nervous system revealed bilateral nystagmus, active limb reflexes and equivocal plantar responses. The Wassermann test had failed to yield a reaction. He had been given iodide of potash 1·2 grammes (twenty grains) three times a day, with increasing doses of *liquor arsenicalis* and had improved considerably for a time. On April 10, 1930, he had complained of increased difficulty in walking and a weakened grip in the right hand. He had again improved on similar treatment. The only sensory change apparent at the time of the meeting was a zone of hyperesthesia on the trunk between the fourth and eleventh dorsal levels.

This patient illustrated well the variability of symptoms which is such a feature in most cases of multiple sclerosis.

Achylia Gastrica.

Dr. Neville also showed a man, aged twenty-one years, who had been admitted to hospital on March 3, 1930, complaining of indigestion, epigastric pain shortly after meals, nausea and vomiting. There was a history of starch indigestion in infancy. He had been in splendid health until twelve months previously and had joined the police force, his work entailing rather irregular hours. He had decided to eat a good deal of wholemeal bread and dated his indigestion from that time. The bread had seemed to ferment in the intestines, causing what he described as a burning feeling in the stomach and much flatulence. He had been quite unable to regain normal digestion and of late the food had regurgitated into the mouth almost as soon as eaten. He had lost 12·6 kilograms (two stone) in weight. He also complained of discomfort and swelling at the back of the tongue. General examination disclosed no abnormalities beyond a rather sallow complexion and a small patch of leucoplakia on the posterior dorsum of the tongue, also a long uvula. Blood examination revealed a count of red cells of 5,900,000 per cubic millimetre, white cells 12,800 per cubic millimetre and a colour index of 0·8. Opaque meal radiographic examination showed the stomach to be in the high position with well marked peristalsis right round to the pylorus, no delay, no ptosis or hypotonicity of bowel, no abnormality at all. Fractional test meal revealed absence of hydrochloric acid in the gastric contents, except for a trace in the fourth sample. Since that time the patient had taken hydrochloric acid with bitters and found he could enjoy his meals, had very little indigestion and had gained 3·1 kilograms (seven pounds) in weight. He had been given a good vitamin food in the hope of stimulating gastric acid secretion; but a further test meal on May 15 had revealed no trace of free or combined hydrochloric acid. On one occasion he had complained of a sore throat and a little pus had been expressed from the right tonsil.

Dr. Neville said that this patient illustrated the condition of achlorhydria with glossitis which, in conjunction with a septic focus, was found in the earlier history of many conditions such as pernicious anaemia, sprue, subacute combined degeneration of the cord *et cetera*. It seemed right in this instance to remove any discoverable septic focus and to administer hydrochloric acid. One might endeavour by administration of vitamins or of liver or stomach preparations to stimulate gastric acid secretion. The condition, however, did not suggest any considerable degree of vitamin deficiency to account for the absence of hydrochloric acid.

A MEETING OF THE SECTION OF MEDICINE OF THE NEW SOUTH WALES BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held in the Robert H. Todd Assembly Hall, British Medical Association House, 135, Macquarie Street, Sydney, on June 19, 1930, Professor A. E. Mills in the chair.

Collapse Therapy in Pulmonary Diseases.

DR. SINCLAIR GILLIES read a paper on "Collapse Therapy in Pulmonary Diseases: Indications for and against Inducing Artificial Pneumothorax" (see page 119).

DR. H. A. RIDLER thanked Dr. Sinclair Gillies for his paper. He said that he was Dr. Gillies's resident in 1915 and, judging by the way he appeared to be working all day, he thought that Dr. Gillies had done more than six cases in 1915. He then went on to discuss results of artificial pneumothorax in those patients who had come under his observation. Quite a large number had apparently died. He remembered one patient suffering from haemorrhage in whom the treatment was successful. With regard to temperament, he quite agreed with Dr. Gillies and recalled a crabby woman with pleural adhesions who complained of considerable pain and with whom the treatment had had to be abandoned. Discussing the technique of the treatment, he said that at that time nitrogen was used instead of air and that it was a difficult matter to keep sufficient supplies of nitrogen always on hand. He further said that the patients treated by pneumothorax therapy presented a gold mine of physical signs for the students.

DR. COTTER HARVEY said that he thought it would be agreed by those present that they were fortunate in having heard such an able address by one who was a pioneer in this country in the treatment of pulmonary tuberculosis. He doubted if anyone in Australia had had such experience as Dr. Sinclair Gillies in the treatment of this malady and indeed of all chest diseases. Dr. Gillies's figures, of only two deaths among sixteen patients treated during sixteen years, gave evidence of his exceptional skill in selecting patients for collapse therapy. Though this was only a small series, he felt sure that these figures would not be rivalled in any country in the world.

Though he proposed later to discuss a few points arising out of Dr. Gillies's paper, he had prepared a few notes as a contribution to the general discussion. He felt that they would at least possess the merit of stimulating controversy.

There was observable a general tendency on the other side of the world to utilize collapse therapy at an earlier stage of pulmonary tuberculosis. A study of the literature convinced him that every year showed the pendulum swinging still further in the direction of early artificial pneumothorax.

Apart from those in the medical profession who were entirely ignorant of artificial pneumothorax, there were three present-day attitudes towards this treatment: (i) That it was to be employed only in advanced cases, as a last resort. The performance of artificial pneumothorax in these cases only had brought the treatment into disrepute. (ii) That it should be tried after a reasonable spell at a sanatorium or a "rest cure" had failed to stay the progress of the disease. This was the view held by the majority of physicians. It was conservative and "safe," but was it in the best interests of the individual? (iii) The third view was a rare one, though it was gaining

ground, namely, that artificial pneumothorax should be induced in suitable cases at the earliest possible moment.

It was this latter view that he would like to urge for their consideration. The reasons were varied. First, the argument was advanced against this radical theory that many patients recovered under the old and tried methods of rest, fresh air *et cetera* and why should these people be subjected to the dangers and duration of pneumothorax? It had even been stated that by initiating collapse therapy, they deprived the patient at one blow, so to speak, of all other forms of treatment. This latter statement was, of course, incorrect; artificial pneumothorax was supplementary to any other form of treatment that might be desirable. To consider it an exclusive treatment was a false and a most dangerous doctrine.

Unfortunately in the State of New South Wales their obsolete sanatoria made no provision for either the induction or the maintenance of artificial pneumothorax. It was somewhat of a scandal in Dr. Harvey's opinion that at Waterfall Sanatorium, with 470 beds, this treatment had no place. He could speak further on this, but he was digressing. He merely mentioned this to concede the point that at present it might be necessary for the physician to decide whether his patient should have the benefit of sanatorium treatment or of collapse therapy. This problem should never arise in any modern community. Unless there were contraindications, in the majority of cases the patient should have both. Thereby their statistics would make for more pleasant reading than they did.

To return to the objections. The dangers, as those who practised artificial pneumothorax would agree, were very slight indeed. And they were nothing compared to the danger of delaying the treatment until it was too late. The duration mattered very little; who cared about the slight inconvenience of attending every month or so for a refill, even though it be maintained for three or more years? The patient could continue his work and this was a small price to pay in return for good health.

But they might think he was overstating the case. Many of the patients would be cured by six months' sanatorium or similar treatment; why worry them for three years with refills? This was true enough, but could they be sure in the individual that he or she would be one of those fortunate ones. In a critical survey of patients treated in a large continental sanatorium with an adequate follow-up system, a large number of "early" cases was treated, half with and half without the addition of artificial pneumothorax. It had been found that two years later approximately 40% of the latter were apparently cured; in 75% of those treated with artificial pneumothorax the condition was apparently arrested.

Put in another way, with sanatorium or comparable treatment, the early condition had two chances out of five of being arrested. A survey of any sanatorium statistics or even their own experience would show this, he thought, to be a fair estimate. If they added to this artificial pneumothorax, however, there were three chances out of four of arrest occurring. His impression from his own cases in private practice and at the Royal North Shore Hospital was that this latter estimate was also a perfectly fair one. They should ask the patient what odds he would prefer.

Again they might argue, why the hurry? They could watch the patient closely for, say, three months and if he was not improving, then they could cause collapse of the lung. This observation was practicable as a rule only in a sanatorium with a resident physician and the objection at once arose: there was no guarantee that a possible artificial pneumothorax at one moment would continue to exist, for two reasons: (i) Often a plastic pleurisy supervened and artificial pneumothorax was therefore prevented or at best was unsatisfactory; (ii) the lesion might become bilateral and prevent thought of artificial pneumothorax. Both these experiences had befallen him more than once in sending patients to the Queen Victoria Homes.

There were other arguments in favour of early artificial pneumothorax which he would merely enumerate. The

patient could return earlier to work, restoring his sense of social value, an important psychological aspect. From a prophylactic viewpoint it was possible more rapidly and certainly to sterilize the sputum by this means.

Dr. Harvey said that he would urge the following statement for their careful consideration. In not undertaking artificial pneumothorax when it was indicated one incurred a graver responsibility than in attempting its creation. One very rarely repented of having undertaken this therapeutic procedure, but one often deplored not having been able to perform a successful one. To this rule of early collapse therapy he would offer two exceptions: (i) Those in whom the lesion commenced in and was limited to the apex of the lung. The benign course of this type of pulmonary tuberculosis had been emphasized by many writers. They were the backbone of the favourable sanatorium statistics and at present he regarded these as not requiring artificial pneumothorax unless they chanced to have recurrent haemoptyses, when it should, of course, be carried out. (ii) The other class he excluded at present, but he hoped before long to rule out this objection. This comprised the patients who had no chance of rest and good food at home: mothers with large families, those who were in actual poverty, in short, those in whom economic environment was bad. Sanatorium was the only place for these patients, but he hoped that before long this would include as part of its treatment that of artificial pneumothorax. They must remember that artificial pneumothorax had become an accepted method of treatment only through years of trial when other methods had failed. The time had arrived when it must be regarded not only as an accepted, but as an obligatory one in certain cases. Most patients passed through a stage when artificial pneumothorax could have been carried out, though many never sought medical advice until this stage had passed. They should always be on the lookout to find the patient in this stage; whereas not more than 5% of patients were deemed suitable for artificial pneumothorax, he believed that this percentage could be considerably raised.

It must not be thought, however, that he was an exuberant enthusiast in this method of treatment. At the pulmonary clinic of the Royal North Shore Hospital they selected less than 10% of patients for this treatment; that the patients did not come early enough was one reason and economic factors also weighed. During the past three and a half years the number of patients on whom collapse treatment had been commenced, had been ten, nine, nine and six for the previous six months. These figures, though proportionately in excess of those at the Royal Prince Alfred Hospital, were not greatly so.

He quite agreed with Dr. Gillies that constant X ray control was necessary. He thought the opener took rather a gloomy view of bilateral involvement. The Matsons, from a study of 492 cases at least two years after cessation of treatment, concluded that the presence of even active disease in the opposite lung did not contraindicate artificial pneumothorax unless the disease was extensive or of a rapidly advancing character.

When he was a resident at Brompton seven years before, his honorary physicians had taken as a rough working rule "less than one-third of the opposite lung"; beyond this collapse therapy was not attempted.

He agreed that alternating collapse was unsound in theory. Bilateral and selective collapse was suitable only in the hands of a sanatorium physician. From a limited experience, he had found both methods of value, but they were too time-consuming, both for physician and patient.

He had had good results in five out of six lung abscesses. The problem was certainly one of drainage and why not drain *per vias naturales*? Of course, selection of the case was necessary, for instance an apical abscess nearly always drained itself and underwent spontaneous cure.

Regarding phrenic avulsion, he did not think Dr. Gillies had placed the case quite fairly. One could reply that a case had yet to occur in which any disability had followed permanent paralysis of one half of the diaphragm. The operation had been performed many hundreds of times and its critics had not to Dr. Harvey's knowledge reported an adverse case. He had had the operation performed on

nine patients with no ill effects, on six with considerable benefit.

Phrenic avulsion had certain definite indications, but he agreed that careful consideration was required before its performance.

In regard to temperament, some patients were doomed from the beginning of their infection, no matter how slight their lesion, nor what treatment was adopted. Considerable experience was required to pick those of hopelessly wrong temperament.

Dr. Harvey concluded by expressing the wish that, should he ever be unhappy enough to contract unilateral tuberculosis, he might have the good fortune to have an early artificial pneumothorax performed by Dr. Sinclair Gillies.

DR. PAUL TILLETT said that he wished to tender his thanks to Dr. Gillies in appreciation of his paper on a subject which, with good reason, had gained respect throughout the world. In the induction of collapse the choice of patient was very important and they must fully understand beforehand that once the treatment was commenced it must be continued over a period of years. If they should fail to attend for refills and the lung became expanded, there would be little likelihood of a further collapse being possible.

In Switzerland a patient suffering from bilateral disease was regarded as unsuitable until good improvement had been established on one side. Bilateral disease was not always excluded from this type of treatment, though the risks of failure were naturally greater. He had seen a patient on whom double pneumothorax had been performed, show excellent progress, though he did not say that a cure had resulted. This patient, when Dr. Tillet last saw him eighteen months before, was confined to bed with constant pyrexia and repeated haemorrhages. He had last heard from him about a month previously and he was up and about again since the other lung was made to collapse. Another patient with similar treatment had not progressed so well.

He thought the chief indications for inducing a collapse were: (i) Patients showing marked toxic symptoms or having repeated haemoptysis, (ii) patients with rapidly retrogressive tuberculosis, (iii) patients with slowly retrogressive tuberculosis, (iv) those patients whose occupation had to be considered and for whom prolonged rest was difficult.

All these types should manifest signs only on one side. Regarding "Gomonal" and other oily fluids used in collapse therapy he could only say that at the time he left Switzerland in 1929 they were not regarded favourably and had practically been discontinued except in those patients who for some reason were not able to attend for regular refills. Some of the complications that had arisen in these patients were puncture of the diaphragm and lung and occasionally abscess formation beneath the visceral pleura. Fortunately these were not of common occurrence. The discomfort of the patient was greater, due to the increased weight on the diaphragm and displacement of the mediastinum.

Another type of collapse tried in patients with disease at the apex in whom adherent pleura prevented collapse by usual methods, was the injection of wax outside the parietal pleura. This had not met with success, as the wax was liable to creep and suppuration had also resulted.

The advantages to be gained from collapse therapy were great, but careful consideration had to be exercised and because a patient had tuberculosis he should not be regarded immediately as suitable for this form of treatment. The after-treatment did not differ from that of a straightforward case and rest and usual care must be adhered to if good results were to ensue. He had been interested only in the diagnostic side and his observations had been on patients under the care of others in sanatoria and hospitals in different parts of the world, so he felt that his remarks advocating collapse therapy were without prejudice.

DR. NEVILLE DAVIS thanked Dr. Gillies and congratulated him on his results. He said Dr. Gillies was the foremost

authority on pneumothorax therapy in New South Wales, if not in the Commonwealth. He went on to say that when physical examination had disclosed that the patient appeared suitable for collapse therapy, it was essential that a skiagram and screening should be done at which it was desirable that the physician should be present. If the decision was to perform a pneumothorax, a great deal of information would be gained. At all subsequent screenings the physician and radiographer should collaborate.

From an examination of the patient every ten days a reasonably accurate estimate could be formed as to the degree of expansion of the lung and the necessary intervals between refills. In this way screenings would on the average be kept down to three or four times a year, making this form of treatment relatively inexpensive and not fatiguing to the patient, especially as the modern apparatus rendered collapse therapy easy to be performed at the patient's home.

The average person who developed pulmonary tuberculosis had the idea that no active treatment could be given to help him towards recovery and that was one reason why so few early unilateral cases were seen. Even the general practitioner was hazy as to its efficacy and in innumerable cases the ideal time for collapse therapy had gone and valuable opportunity for saving life had been lost.

Bilateral infection was not suitable for this form of treatment and his experience was similar to that of Dr. Gillies that, although it might prolong life, it was not a method to be recommended and was liable to bring collapse into disfavour. Even when one side appeared quiescent or chronic and fibrotic, the extra strain seemed to provoke renewed activity.

As regards the use of collapse therapy in early active cases, he would go much further than Dr. Gillies and advise this form of treatment whenever they could carry conviction to the patient and necessary relatives. He did not wait to see what general treatment would do and gave them the reasons for the faith that was in him. In one of the large sanatoria of America in 1916 there were two forms of treatment in early cases: that of those who believed in collapse therapy and that of those who trusted to general sanatorium measures. It had been decided that results should be followed up. One hundred patients had been indiscriminately selected by each advocate and at the end of seven years from the commencement of each case it had been found that there were alive and participating in daily routine life three times as many from those who had had the benefit of collapse therapy as there were from those who had been denied it. The wait-and-see policy was dangerous. It was not economically any sounder and frequently valuable time for arrestment of disease had been lost and opportunity wasted. No one would say that collapse therapy in these cases did harm. He had never seen a fatality from it due to pleural shock, embolism *et cetera* with up-to-date apparatus. It was absolutely safe, simple, could be conducted at the patient's home, inexpensive and had a definite psychological influence for good on the patient and statistically had been proved to be an advance on any other form of treatment. Early, very early, diagnosis, supported by personal collaboration with the radiographer, a more widespread knowledge amongst the profession of its value and the mortality rate of pulmonary tuberculosis would unquestionably improve. It should be remembered that all cases of pulmonary tuberculosis were early cases at one stage and just as in acute appendicitis it was wiser to remove an inflamed appendix that might have subsided, than allow some patients to die from the wait-and-see expectant policy, the realization of which was only too frequently a funeral. It would be easy to arrange for physicians competent in this form of treatment to visit centres where there were many patients, start the treatment and if necessary instruct the local men in its use and continuance. Again, almost from the first month or so there was considerable diminution and disappearance of sputum of the patients who were no longer infective to those who nursed and surrounded them. Surely this

treatment opened up a wide scope in therapeutic and prophylactic measures in pulmonary tuberculosis.

Distinction must be made between pleural effusion as a result of pulmonary tuberculosis which he called active pleural effusion to differentiate it from reactive pleural effusion, which not infrequently followed collapse therapy. It was wise in the former instance to make sure by radiography that there was not any infection of the opposite lung, as the systemic symptoms might not be due to the pleural effusion and that lung, but to toxæmia from the opposite lung in which few physical signs other than those of hyperæmia could be elicited. Removal of the fluid and replacement with gas or air seldom did good under these conditions and not infrequently harm.

Reactive pleural effusion was in his opinion a favourable prognostic sign and did not require interference, unless causing cardiac, respiratory or gastric distress. It afforded them collapse therapy without the necessity of refill except at long intervals.

Collapse therapy in non-tuberculous pulmonary disease had given varying results in the hands of different workers, due probably to the types of cases selected. It should be adopted in early cases of bronchiectasis or persistently unresolved pneumonia as he preferred to call it, now so easily diagnosable by the aid of "Lipiodol" injection. These cases were so often complicated with sinus infection, a factor which seemed not to have been recognized in the past and probably the cause of failure of collapse therapy in these types of cases.

Phrenic avulsion was destructive and not constructive treatment and in his opinion should be reserved for late cases characterized by persistent and absolutely intractable cough, whether tuberculous or non-tuberculous in origin.

DR. G. C. WILLCOCKS also thanked Dr. Sinclair Gillies. He said that he had some experience of the production of artificial pneumothorax. He quoted the case of a relative suffering from tuberculosis who was immensely impressed by the value of artificial pneumothorax therapy but had not had it performed upon himself. Dr. Gillies had quoted some very instructive figures, but Dr. Willcocks wished to ask how the advocates of more widespread use of artificial pneumothorax therapy would treat out-patients living in Surry Hills or Miller's Point. He asked whether they would perform artificial pneumothorax therapy and in doing so rob patients of a change in the country which was unavoidable with the present arrangements in New South Wales. Dr. Willcocks stressed the importance of general treatment.

DR. C. G. McDONALD joined with the other speakers in commending Dr. Gillies's paper. It was a masterly review of the subject, handled judicially and critically. Some of his friends had jocularly accused Dr. Gillies of "dyed-in-the-wool" conservatism, but a physician who was certainly the first in Sydney to induce pneumothorax and who could under certain conditions recommend thoracic collapse and phrenic avulsion, was stamped with a strange brand of conservatism.

Dr. McDonald had studied the results of artificial induction of pneumothorax over a period of years at the Anti-Tuberculosis Dispensary of the Royal Prince Alfred Hospital. He had learned to recognize the limitations of this method of treatment. He thought that there was a tendency to apply it in too many instances, whereas the patients in whom induction was indicated, were few. He opposed the growing practice of applying it to those who suffered from tuberculous disease involving both lungs. The essence of the treatment was that it afforded rest to the affected lung and that it caused stasis of the circulation, thereby lessening absorption of tuberculous products and migration of tubercle bacilli. While this hypothesis was highly suggestive, he ventured to assert that it had not been proved. He did not know of any large series of patients treated by induction who had been compared with a similar number of controls. The figures quoted by Dr. Harvey were too few to justify any conclusions. Nevertheless there could be little doubt of the value of the treatment in many instances. For example, only an intolerant person would deny its efficacy in the control of recurrent haemorrhage from a cavity when the radiographic and clinical appearances localized the disease in one lung.

Of patients at the Anti-Tuberculosis Dispensary on whom artificial pneumothorax had been performed (not for the control of haemoptysis, but as a general therapeutic measure), he thought that the majority had improved. Of twenty-three patients under the care of other physicians and himself, three were declining in health, four were neither helped nor retarded by the treatment, while the remainder were definitely improved. In how many instances the improvement had occurred for the reasons usually advanced, he found it difficult to say. Early last year two young women had been admitted to hospital under his care for the induction of pneumothorax. Both had had tuberculosis apparently limited to one lung. He had experienced no difficulty in causing collapse of the lung of one woman and from the beginning of the treatment she had progressed in health. The other patient had for a period of twelve months been treated on nutritional lines with long spells in bed, but had continued to deteriorate. Her loss of weight had been continuous, her pulse rapid and her temperature high. A month in bed at the Royal Prince Alfred Hospital prior to induction had not bettered her condition. As a radiograph had demonstrated in the hilar region a unilateral tuberculous process with cavity formation, she seemed eminently suitable for the treatment, but three attempts to enter the pleural sac had been unsuccessful, owing, apparently, to dense adhesions between parietal and visceral layers of pleura. Nevertheless the patient had responded with a fall of temperature and pulse rate, increased appetite and growth-in weight and was now in apparent good general health. It was likely that in some cases at least suggestion played a big part. If the method were not used to the exclusion of other forms of treatment and if all care were taken to select patients who by reason of domestic comfort, intelligence and limitation of the lesion were suitable subjects, the treatment was not only justifiable, but advisable. It should not be forgotten, however, that the main treatment of tuberculous disease still remained a problem of promoting rest and nutrition.

In reference to the treatment of abscess of the lung, Dr. McDonald agreed with Dr. Gillies that the majority of patients suffering from this condition recovered if not subjected to interference. The induction of pneumothorax when the abscess was located in an upper or in a lower lobe might well precipitate a tragedy by closing communication between the abscess and a bronchus. This was especially likely to occur when pleural adhesions were present. He disagreed with the statement of one speaker that the insertion of a needle into the chest was a harmless procedure. Apart from the possibility of sudden death from "pleural shock" (now rendered less likely by more careful technique), the failure to compress a lung equally over its whole surface towards the hilus might in cases of pulmonary abscess cause rupture of the pus into the pleural sac or, worse still, the formation of a spontaneous valvular pneumothorax with great rise in intrapleural pressure with each successive cough, causing dislocation of heart and mediastinum with attendant dangerous dyspnoea. He had had experience of one case in which the latter catastrophe had taken place after induction of artificial pneumothorax for the treatment of pulmonary abscess. Urgent resection of a rib by a surgeon had saved the patient's life.

DR. WILFRED EVANS said that he had in common with the other speakers appreciated Dr. Gillies's paper immensely. There were just one or two points upon which he would like to comment. Dr. Gillies rightly stressed the importance of toxic symptoms and the presence of tubercle bacilli in the sputum as indications of activity and the necessity for the induction of artificial pneumothorax in unilateral infections, but he scarcely gave a sufficiently worthy place to physical signs. The presence of moist sounds and in particular the signs of definite cavitation in one lung were, Dr. Evans considered, the indications *par excellence* for artificial pneumothorax and in his limited experience such cases had given the most striking results. He felt that the next most important class was those whose temperature remained normal in bed, but immediately flared up when they attempted ambulant treatment.

With regard to the vexed question of abscess of the lung, he thought that when an abscess was deeply seated and a reasonable period had elapsed to allow it to become encapsulated, the risk of the induction of artificial pneumothorax should be taken in order to try to prevent the months of chronic intoxication which the patient otherwise endured, and to lessen the probability of secondary fibrosis and bronchiectasis. If the abscess was small and deeply situated, the risk of rupture into the pleura should not be great.

With regard to bronchiectasis, he agreed with Dr. Gillies that the results of artificial pneumothorax were disappointing, but if combined with phrenicotomy might be good. He had recently had a patient at the Children's Hospital, a girl, aged thirteen years, suffering from marked fibrosis of one lung and bronchiectasis with thickened pleura, in whom the improvement after phrenicotomy was striking. Six pounds in weight had been gained in three months, whereas she had made no progress for years before.

In children the operation of artificial pneumothorax had much more technical difficulty than in the adult, as an anaesthetic was often required and the instrument was frequently disorganized by coughing under anaesthesia and the whole performance was very tedious and exacting.

DR. A. J. COLLINS thanked Dr. Gillies for his excellent paper. As he was a pioneer in the use of artificial pneumothorax treatment, Dr. Gillies's opinion commanded the greatest respect. Dr. Collins stated that he was a firm believer in the value of this treatment. Of all the vaunted cures of pulmonary tuberculosis this method alone had stood the test of time. He was constantly on the lookout for patients suited for treatment by this means. During the past seven years he had been in charge of the treatment of tuberculous soldiers at the Prince of Wales Hospital and in the Red Cross sanatoria and in addition during the past five years he had worked in the antituberculosis department of the Royal Prince Alfred Hospital. Yet despite the large number of patients thus handled in addition to those seen privately, he had seen very few suitable for artificial pneumothorax treatment. In that period he had induced artificial pneumothorax on eight patients only. Perhaps he was unfortunate in not finding more, but he considered that, in view of the large numbers he dealt with, the disease in his patients must be typical of the disease generally in New South Wales. He therefore concluded that his standard of suitability for this treatment differed from that of previous speakers. He was pleased to say, however, that it coincided with the standard laid down by Dr. Gillies.

He did not favour the induction of bilateral pneumothorax either in alternating manner or when partial simultaneous bilateral induction was employed. He had no intention of asking his patients to submit to such until statistics, which could be so fallacious, and accumulated experience had proved it to be helpful.

In so far as non-tuberculous diseases of the lung were concerned, he considered that treatment by artificially induced pneumothorax was extremely limited. He had tried it in bronchiectasis and had found it to be useless.

In conclusion he congratulated Dr. Gillies upon the excellent manner in which he had presented his material, upon his results and upon his conservatism.

DR. H. R. SEAR was asked by the Chairman for his experience in these cases and he stated that of the patients suffering from pulmonary tuberculosis submitted to him for X ray examination about 5% were suitable for this method of treatment.

DR. ALLAN WALKER also wished to thank Dr. Gillies. He stated that although he had small personal experience of this method of treatment, he leaned towards Dr. Gillies's views. With regard to the suitability of patients, he would be inclined to state that less than 5% of patients suffering from pulmonary tuberculosis were suitable for this treatment. Discussing the treatment by artificial pneumothorax in non-tuberculous conditions, he stressed the danger of septic complications such as the occurrence of a contralateral bronchopneumonia. He said that tuberculosis presented grave economic and social difficulties. He was inclined to be more optimistic than Dr. McDonald, but he regarded the case for artificial pneumothorax as proved.

DR. SINCLAIR GILLIES in reply to the various speakers said that Dr. Ridler's remarks had called to mind a rare complication of artificial pneumothorax, namely, tuberculous fistula following tapping a purulent effusion. He agreed with Dr. Ridler that many interesting physical signs were found in these cases of artificial pneumothorax and suggested that they must review their explanation of the production of amphoric phenomena.

With Dr. Harvey he was in complete accord and complete disaccord. He agreed that artificial pneumothorax therapy in slight early cases was satisfactory in sanatoria, but stressed the importance of environment and stated that if he were practising on the Blue Mountains he would do considerably more inductions than he did in Sydney. He said that prior to the war there had been a wave of enthusiasm for this method of treatment, but the advent of the war had kept the profession occupied with other things. He stressed the fact that at least 45% of the people over forty-five years of age showed some sign of tuberculosis at autopsy. The difficulty was to know where to draw the line and what patients to treat. It was a troublesome method of treatment and he compared it to milking cows in that once the treatment was started it had to be kept up regularly, whether convenient or not.

With regard to the cases of bilateral disease he thought that two years was too short a period on which to base any conclusions, and he thought that the figures would not be so good as time went on.

With regard to phrenicotomy, he raised the question as to whether it was justifiable to paralyse one side of the diaphragm for life and said that if the patient developed trouble in the other lung, he would be in a very parlous condition.

Discussing bronchiectasis, he stressed the importance of postural drainage. He agreed with Dr. Willcocks that the economic factor was a most important one.

DR. McDONALD's remarks had recalled to mind two early and similar cases treated in sanatorium. One man had had artificial pneumothorax produced and he put on seven pounds in weight, the second had not had artificial pneumothorax done and he put on fourteen pounds in weight. Such cases made him wonder how much they were doing with this method of treatment.

Replying to Dr. Evans he said he was interested to hear that there was considerable difficulty in inducing artificial pneumothorax in small children, as he thought that early bronchiectasis in children might be suitable for the treatment. He again stressed the fact that phrenectomy was a very serious operation, especially in young children where it meant that the diaphragm on one side would be paralysed for life.

At the conclusion of the discussion artificial pneumothorax apparatus were shown by various members.

DR. SINCLAIR GILLIES and DR. A. J. COLLINS showed their modifications of Lillingston and Pearson's apparatus, while DR. STOBO demonstrated the Stokes-Stobo modification of the same apparatus. DR. NEVILLE DAVIS showed Heaf's apparatus, while DR. COTTER HARVEY exhibited a French apparatus.

NOMINATIONS AND ELECTIONS.

THE undermentioned have been elected members of the Queensland Branch of the British Medical Association:

English, Peter Bede, M.B., B.S., 1927 (Univ. Sydney), Capella, Queensland.

Henderson, John Hector Baillie, M.B., B.S., 1928 (Univ. Sydney), "Ingledoon," Norman Park, East Brisbane, Queensland.

Post-Graduate Work.

LECTURES IN MELBOURNE.

A SERIES of post-graduate lectures on infant welfare arranged by the Council of the Victorian Branch of the British Medical Association has been given in Melbourne.

The Premature Baby.

The first lecture on the care of the premature baby was delivered by Dr. Kate Campbell on May 15, 1930. This lecture is published in this issue.

Dr. H. Boyd GRAHAM said that he had found that the fat content of lactic acid whole milk was the factor which caused difficulty in digestion and that by the use of separated milk treated with lactic acid a suitable artificial feeding of high caloric value might be used satisfactorily. He suggested the value of establishing the lactation of the mother of a premature infant by using a strong baby for suckling. The complementary feeding of the premature babe could then be carried out without jeopardizing the establishment of lactation and also without so great an initial loss of weight. It would seem that twenty to thirty days was too long a time for the premature babe to regain his birth weight and Doctor Graham considered that they should endeavour to shorten this time by giving such babies a higher total number of calories in the early days of life.

Dr. Graham had had experience of the Morganthaler incubator, costing £100, and of the Queen Charlotte type, costing £40, and was of opinion that the home-made incubator demonstrated by Dr. Campbell was the best incubator for premature babes. Dr. Graham concluded by expressing his appreciation of Dr. Campbell's able lecture.

The remaining lectures of the series will appear in subsequent issues.

Correspondence.**DIATHERMY OF TONSILS.**

SIR: May I reply to Dr. T. J. Henry's letter in the journal of July 12? Dr. Henry appears to miss the main points of my comments on Dr. Cahill's first communication. He refers to Dr. Cahill's "bold removal of his own tonsils." If he reads Dr. Cahill's statement carefully, he will realize that Dr. Cahill did not remove his tonsil; although he stated he "desiccated" and "coagulated" his tonsils, what he really meant was that he partially desiccated his tonsils *et cetera*; this he indicates later on when he says he is prepared to apply diathermy to the remains at a future date.

Dr. Cahill wrote of pain and discomfort lasting four to ten days after "every surgical tonsillectomy," which statement I characterized as grossly exaggerated and biased. Let me refer to two of my patients, one a lady of sixty-four years, who had a complete tonsillectomy under local anaesthesia. When the operation was completed she rose from her chair and said: "I suppose I can go home now." The operation was an easy one and at no time subsequently did she suffer any pain therefrom. The second patient had a general anaesthetic and when I saw her the next day she wished to go home, as she was perfectly free from discomfort and she suffered no pain whatsoever at any time after the first twenty-four hours. But the important point is that in these cases the tonsils were removed and therefore there were no "remains" to cause trouble later on and to require further treatment. Patients frequently state that the pain and discomfort of the operation and convalescence are as nothing compared with what they have previously suffered from sore throats, yet Dr. Cahill has the effrontery to state that such results do not occur, presumably because he is unable to get such results himself.

Any competent throat surgeon knows that the majority of children who undergo surgical removal of tonsils, practically forget all about it after twenty-four to forty-eight hours. Perhaps Dr. Cahill did not include children in his "every case"; if not, then why did he not say what he meant?

As I pointed out, Dr. Cahill's statements are so contradictory and inaccurate as to be void of scientific value.

I did not refer to Professor Portmann's technique as "comic opera," but to the entertainment so naively provided by Dr. Cahill in your journal and as for his final

paragraph in the journal of July 5, he appears to be emulating that celebrated character of fiction, Don Quixote.

Diathermy of tonsils undoubtedly has its place, but those who advocate its use to the exclusion of surgical methods must produce better average results than are produced today and should not resort to diathermy simply because they are unable "to perfect themselves in the technique of surgical tonsillectomy."

I apologize for taking up your space, but the importance of the matter required it. This, however, is my final contribution to the present discussion.

Yours, etc.,

ERNEST CULPIN.

Brisbane.

July 7, 1930.

SIR: Reference having been made in your issue of June 21 to diathermic electrodes shown by me at the recent medical congress, I wish to state that they were intended to demonstrate the bipolar method with two active electrodes insulated (snare and volsselum) as distinguished from the bipolar method with only one active electrode. While useful in dealing with pharyngeal tumours, I do not now feel justified in using this or any other diathermic methods for removing tonsils, unless surgical tonsillectomy is contraindicated. Being unable to agree with Dr. Cahill's statement in your journal of the 5th instant, that Professor Portmann "long ago abandoned surgical tonsillectomy" *et cetera*, I attach herewith cablegrams in which Portmann himself "hastens to deny the soft impeachment."

Yours, etc.,

GARNET HALLOAN.

Sydney.

July 11, 1930.

To Professor Georges Portmann,
Cours de Verdun, Bordeaux.

Greetings. Please state your usual method removal tonsils, whether diathermy or dissection. Kind regards.

Doctor Garnet Halloran, Sydney.

July 10, 1930.

Doctor Garnet Halloran, Sydney.

Sluder's method for children, dissection for adult. Kind regards, Portmann.

VISIT OF PROFESSOR J. T. WILSON.

In the issue of this journal reference was made to the formation of a committee with the object of arranging a function in honour of Professor J. T. Wilson who is visiting Sydney. On July 1, 1930, the visit of Professor Wilson was mentioned at a meeting of the Faculty of Medicine by Professor J. C. Windeyer, Dean. A committee was formed at the faculty meeting. Arrangements have been made for the amalgamation of these committees and a conversazione will be held at the Medical School on the evening of August 26, 1930. A further announcement will be made.

THE ARMIT FUND.

THE following is the list of those who have subscribed to the Armit Fund:

A.E.F., A.L.W., Dr. M. Archdale, Dr. J. R. Barriskill, Dr. E. H. Beaman, Dr. George Bell, Dr. J. Brown, Dr. A. G. Butler, Dr. B. L. W. Clarke, Dr. C. E. Corlette, Dr. Gordon Craig, Dr. F. Brown Craig, Dr. Mary De Garis, Dr. J. A. Dick, Dr. T. Storie Dixon, Dr. A. W. D'Ombrain, Dr. B. T. Edye, Dr. E. W. Fairfax, Dr. W. M. A. Fletcher, Dr. R. Fowler, Dr. R. P. W. Francis, Dr. A. J. Gibson, Dr. Sinclair Gillies, Dr. A. M. Gledden, Dr. H. J. Gray,

Dr. F. J. Gwynne, Dr. S. Harry Harris, Dr. Cotter Harvey, Dr. T. J. Henry, Mr. W. J. Kelly, Dr. W. L. Kirkwood, Dr. T. W. Lipscomb, Dr. C. G. McDonald, Medical Benevolent Association of New South Wales, Dr. A. V. Meehan, Melbourne Permanent Committee for Post-Graduate Work, Dr. L. J. J. Nye, Dr. A. A. Palmer, Dr. M. S. Patterson, Dr. C. N. Paul, Dr. J. J. Power, Dr. Christina Reid, Dr. H. J. Ritchie, Dr. W. N. Robertson, Dr. H. H. Schlink, Dr. R. Scot Skirving, Dr. M. G. Sutton, Dr. N. Sutton, Dr. A. H. Tebbutt, Dr. R. H. Todd, Dr. G. C. Willcocks, Dr. G. L. L. Lawson, Dr. D. G. Croll, Dr. S. F. McDonald.

Books Received.

CONGENITAL CLUB-FOOT (TALIPES EQUINOVARUS), by E. P. Brockman, M.Chir., F.R.C.S.; 1930. Bristol: John Wright and Sons Limited; London: Simpkin Marshall Limited. Royal 8vo., pp. 118, with illustrations. Price: 10s. 6d. net.

A TEXTBOOK OF HYGIENE, by J. R. Currie, M.A., M.D., D.P.H., M.R.C.P.; 1930. Edinburgh: E. and S. Livingstone. Demy 8vo., pp. 864, with 110 illustrations. Price: 27s. net.

SLIT-LAMP MICROSCOPY OF THE LIVING EYE, EARLY DIAGNOSIS AND SYMPTOMATOLOGY OF AFFECTIONS OF THE ANTERIOR SEGMENT OF THE EYE, by F. E. Koby, translated by Charles Goulden, O.B.E., F.R.C.S., and Clara Lomas Harris, M.B., Second Edition; 1930. London: J. and A. Churchill. Demy 8vo., pp. 376, with 104 illustrations. Price: 15s. net.

THE STORY OF A SURGEON, by Sir John Bland-Sutton, F.R.C.S., with a preamble by Rudyard Kipling; 1930. London: Methuen and Company Limited. Demy 8vo., pp. 216, with twenty-eight illustrations. Price: 12s. 6d. net.

Diary for the Month.

JULY 31.—New South Wales Branch, B.M.A.: Branch.
 JULY 31.—South Australian Branch, B.M.A.: Branch.
 AUG. 1.—Queensland Branch, B.M.A.: Branch.
 AUG. 5.—New South Wales Branch, B.M.A.: Organization and Science Committee.
 AUG. 5.—New South Wales Branch, B.M.A.: Post-Graduate Work Committee.
 AUG. 5.—New South Wales Branch, B.M.A.: Hospitals Committee.
 AUG. 6.—Victorian Branch, B.M.A.: Branch.
 AUG. 7.—South Australian Branch, B.M.A.: Council.

Medical Appointments.

Dr. H. V. D. Baret (B.M.A.) has been appointed Medical Superintendent, Lidcombe State Hospital and Home, Office of the Director-General of Public Health, New South Wales.

Dr. J. M. Rainbow has been appointed Senior Medical Officer in the Department of Mental Hospitals, New South Wales, from March 8, 1930.

Dr. W. J. Burns (B.M.A.) has been appointed Certifying Medical Practitioner and Medical Referee at Croydon, Victoria, pursuant to the provisions of the *Workers' Compensation Act*, 1928.

Dr. H. I. Gibb (B.M.A.) has been appointed Certifying Medical Practitioner at Heyfield, Victoria, pursuant to the provisions of the *Workers' Compensation Act*, 1928.

Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, locum tenentes sought, etc., see "Advertiser," page xx.

HOBART PUBLIC HOSPITAL, HOBART, TASMANIA: Junior Resident Medical Officer.

REPATRIATION COMMISSION: Junior Resident Medical Officers.

THE ADELAIDE CHILDREN'S HOSPITAL (INCORPORATED), SOUTH AUSTRALIA: Resident Medical Officers.

WALPEUP MEDICAL ASSOCIATION, VICTORIA: Medical Officer.

Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch mentioned in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.I.

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES:	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company, Limited. Phoenix Mutual Provident Society.
VICTORIAN:	All Institutes or Medical Dispensaries. Australian Prudential Association Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND:	Members accepting appointments as medical officers of country hospitals in Queensland are advised to submit a copy of their agreement to the Council before signing. Brisbane United Friendly Society Institute. Mount Isa Hospital.
SOUTH AUSTRALIAN:	All Lodge Appointments in South Australia. All Contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN:	All Contract Practice Appointments in Western Australia.
NEW ZEALAND (Wellington Division):	Friendly Society Lodges, Wellington, New Zealand.

Editorial Notices.

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